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## 3



# Considerations in Flap Selection

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## INTRODUCTION

A meticulous preoperative problem analysis leading to the selection of the proper strategy for solving the given wound, defect, or deformity<sup>1</sup> can be a difficult task, yet certainly as critical as the actual surgical procedure that may be required. If a vascularized tissue transfer is indicated, there can then be little question that the selection of the correct flap is imperative as, if chosen improperly, the entire reconstructive endeavor may be doomed to failure – no matter how careful the subsequent surgical execution. This initial phase of planning should be appreciated as the most intellectually stimulating and challenging stage, as sometimes the hours spent in the operating room afterwards may seem actually too much like “work.” Unfortunately, if simplicity were the only goal, unlike the early days of plastic surgery, when the only option was to use some variation of the random flap, now an almost overwhelming cornucopia of flap alternatives is available. A “laundry list” of all the available flaps and their indications would be an impossible job, even if limited to the “workhorse” flaps outlined in the other chapters in this book (Fig. 3.1); but a brief dissertation on basic principles to follow in completing this selection process may prove invaluable. An appreciation of the attributes and limitations of the many available flaps (Tables 3.1–3.6) and their specific indications for use (Tables 3.7–3.9) is critical before a decision can be made as to which is most appropriate for the task at hand.

## THE RECIPIENT SITE

The primary objective in the reconstruction of any wound, defect, or deformity, is to restore as closely as possible the “normal”<sup>2</sup> appearance and function; but in that process also to minimize any residual abnormality or accrue any additional disability, including that at the donor site. Many concerns must thus be addressed in an orderly fashion, beginning with an assessment as to whether a vascularized flap is even needed in the first place. Yet if not, would a flap nevertheless still be the preferable solution to provide the most optimal outcome not just for today, but also in the long term?

Specific requirements at the recipient site must be met as closely as possible, beginning with the use of flaps with similar tissue characteristics (Tables 3.1–3.6). In addition, will the structural integrity within the region or function

need to be re-established? Can this be accomplished with a single flap, or are multiple flaps each with different components required? The answers to these basic questions will immediately narrow the search for the proper flap donor site. This is most obvious if specialized tissues such as joints, cartilage, nail, nerve, tendon, bone, or viscera are needed, as the available resources are extremely limited (Table 3.6). On the contrary, soft tissue coverage problems, which are more commonplace, have a plethora of potential options. Herein lies the major dilemma where proper flap selection deserves the most emphasis.

If a local or so-called “pedicled flap” is available,<sup>3–6</sup> and best satisfies all the criteria to provide what is needed, that will always be preferable to the vagaries and inherent risks of a microsurgical tissue transfer. Indeed, the hierarchy for flap selection in the upper<sup>7</sup> and lower extremities<sup>8</sup> has traditionally emphasized the value of local flaps. Although these schema typically have also suggested the use of free flaps for more acral defects,<sup>9</sup> a revolution has recently emerged in the consideration of distal-based regional flaps<sup>10–12</sup> or perforator propeller flaps<sup>13–16</sup> that can capture more proximal extremity skin territories for distal transfer as an acceptable alternative. These newer possibilities can be especially valuable if the patient has multiple comorbidities that would preclude any lengthy surgical procedure, if the allocation of resources including time is limited, or if the requisite technical expertise is absent.

Soft tissue coverage can basically always be achieved using either a cutaneous or muscle flap. Each has distinct attributes that must be considered (Tables 3.1–3.5), and the preference for either will differ from patient to patient. One must remember that the use of any muscle as a flap, even if function preservation techniques were observed,<sup>17</sup> will always result in some loss of function. This risk is minimized if a cutaneous flap or especially if a perforator flap is used.

The availability and quality of the recipient site vasculature if a free flap is indicated for either type of flap, will further limit the alternatives. The length of the potential flap pedicle must be long enough to reach them, and preferably do so without the need for vein grafts. The caliber of the free flap vessels should be similar to and definitely not exceed a 3:1 ratio to those at the recipient site. This will simplify any microanastomosis, increase the patency rate and reliability, and thereby minimize the risk of complications.

Not only must the initial coverage result be satisfactory, but long-term durability and stability,<sup>18</sup> coupled with a reasonable cosmetic appearance must always be a concern

*Text continued on p. 11*