Plastic and Hand Surgery in Clinical Practice

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Classifications and Definitions

Mary O'Brien, MPhil, FRCS (Plast)

Consultant Plastic and Hand Surgeon,
Pulvertaft Hand Centre, Derby, UK

Springer

Mary O'Brien, MPhil, FRCS (Plast)
Consultant Plastic and Hand Surgeon
Pulvertaft Hand Centre
Derby
UK

ISBN 978-1-84800-262-3 e-ISBN 978-1-84800-263-0
DOI: 10.1007/978-1-84800-263-0

British Library Cataloguing in Publication Data

Library of Congress Control Number: 2008936262

Printed on acid-free paper

springer.com

To my parents in whose footsteps I aspire to follow
To my husband whose footsteps I walk alongside
To my children whose footsteps I chase

Preface

THE PLASTIC SURGEON'S CREED
Millard DR, Jr

"Know the ideal beautiful normal. Diagnose what is present; what is diseased, destroyed, displaced or distorted; and what is in excess. Then, guided by the normal in your mind's eye, use what you have to make what you want- and when possible go for even better than what would have been."

THE PRINCIPLES OF PLASTIC SURGERY
Gillies HD, Millard DR, Jr: The Principles and Art of Plastic Surgery. 1st Ed Boston. Little, Brown & Co 1957.

"Plastic surgery is a constant battle between blood supply and beauty.
Observation is the basis of surgical diagnosis.
Diagnose before you treat.
Make a plan and a pattern for this plan.
Make a record- sketches and photographs.
The lifeboat another flap or skin graft.
A good style will get you through- dexterity and gentleness.
Replace what is normal in normal position and retain it there.
Treat the primary defect first - borrow from Peter to pay Paul only when Peter can afford it.
Losses must be replaced in kind.
Do something positive- start with a landmark or two pieces that definitely fit.
Never throw anything away- a preserved piece may be used later.
Never let routine methods be your master.
Consult other specialists.
Speed in surgery consists of not doing the same thing twice.

The aftercare is as important as the planning.
Never do today what can honourably be put off till tomorrow- when in doubt, don't.
Time, although the plastic surgeon's most trenchant critic, is also his greatest ally."

Acknowledgements

I would like to express sincere thanks to Mr Keith Allison FRCS (Plast) and Mr Darren Chester FRCS (Plast) for their contributions in proof reading the manuscript.

I am particularly grateful to the many trainers both medical and those in professions allied to medicine for their teaching, encouragement, and support.

I also gratefully acknowledge the assistance and immense resources made available to me by the excellent library staff at University Hospitals Coventry & Warwickshire NHS Trust.

Without the helpful assistance of the team at Springer- Verlag, this book would not have been published.

Without the support of my family, this book would never have been written. Thank you.

Contents

Chapter 1
Fundamentals of Plastic Surgery

Plastic Surgery
Greek derivation–"Plastikos" = "To mould"

1.1 A "SURGICAL SIEVE"

A useful filter to obtain a pathological diagnosis

Congenital
or
Acquired – Trauma
– Tumour
– Infective
– Inflammatory
– Metabolic
– Endocrine
– Iatrogenic

1.2 THE "RECONSTRUCTIVE LADDER" (FIGURE 1.1)

An evaluation of increasingly complex techniques to achieve wound closure:

Free tissue transfer (complex)
Regional flap
Local flap
Skin graft (split thickness or full thickness, meshed or unmeshed, skin substitutes)
Direct closure
Secondary intention healing (simple or vacuum therapy)

Mary O'Brien, *Plastic and Hand Surgery in Clinical Practice*,
DOI: 10.1007/978-1-84800-263-0_1,

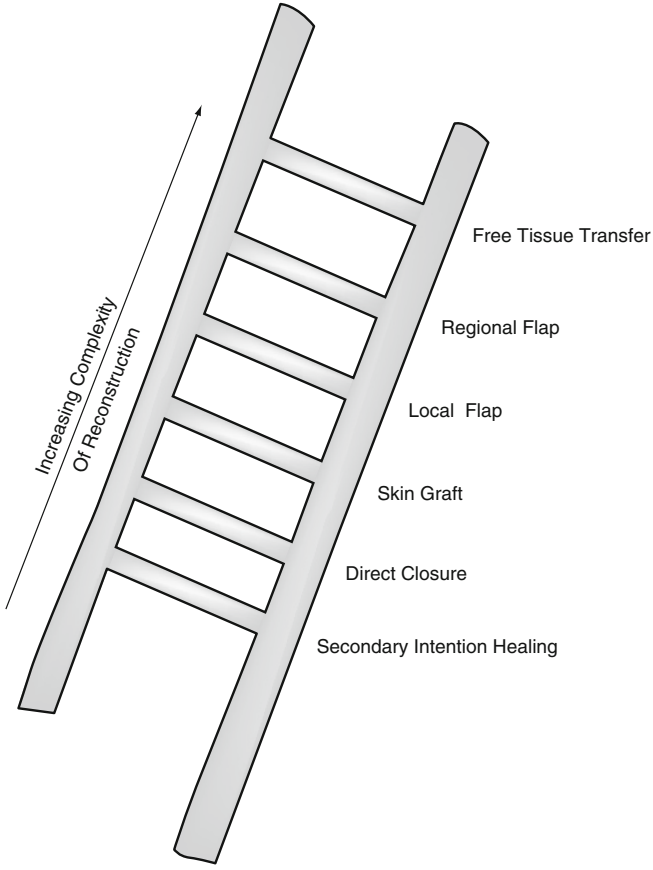

FIGURE 1.1. The reconstructive ladder.

1.3 FRAMEWORK FOR ANSWERING A QUESTION

Incidence
Aetiology/age
Sex distribution
Geographical
Symptoms and signs
Pathology
Macroscopic and microscopic features
Management
Prognosis

Mnemonic

"In A Surgeon's Gown, Some Physicians Might Make Progress"

1.4 CLASSIFICATION OF SKIN GRAFTS

Split thickness	(contain varying amounts of dermis) – meshed or unmeshed
Full thickness	(contains the entire dermis)

Graft
– *Tissue separated from its donor bed and blood supply that relies on the ingrowth of new vessels for survival.*

Primary graft contraction
– *Physiological recoil of a newly harvested skin graft due to its inherent elastic properties. Full thickness skin grafts exhibit greater primary contraction than split thickness skin grafts.*

Secondary graft contraction
– *Contraction of a graft to the dimensions of the underlying wound over the period of graft maturation. Split thickness skin grafts exhibit greater secondary contraction than full thickness skin grafts. (Dermis appears to inhibit the differentiation of myofibroblasts).*

Composite graft
– *A combination of tissue types harvested in unity as a graft.*

1.5 CLASSIFICATION OF STAGES OF SPLIT SKIN GRAFT TAKE

(1) Adherence
(2) Imbibition
(3) Inosculation
(4) Revascularization

Adherence
– *Attachment of the graft to the host bed.*

Imbibition
– *Serum absorption by the graft*

Inosculation
– *Anastomoses between the graft and host vessels*

Revascularization
– *Re-establishment of a blood supply*

1.6 CLASSIFICATION OF FLAPS: "THE FIVE CS"

Adapted from Adrian Richards. Key Notes on Plastic Surgery. Blackwell Science; 2002

Circulation ("blood supply")	– Random pattern – Axial (direct, fasciocutaneous, musculocutaneous, venous)
Composition ("component parts")	– Cutaneous, fasciocutaneous, fascial, musculocutaneous, muscle, osseocutaneous, osseous
Contiguity ("relationship to defect")	– Local, regional, distant, free
Contouring ("type of movement") (Figs. 1.2–1.4)	– Advancement, rotation, transposition, interpolation
Conditioning	– Delay

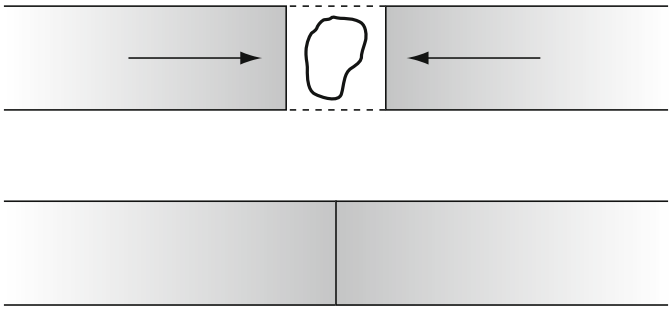

FIGURE 1.2. Bilateral advancement flaps.

Flap

– *A composite block of tissue with its own blood supply.*

Pedicled flap

– *Tissue that remains attached to its blood supply and is transferred from one part of the body to another.*

Perforator flap

– *A flap based on a visible musculocutaneous or septocutaneous perforating vessel that is dissected free from surrounding muscle to obtain the desired pedicle length.*

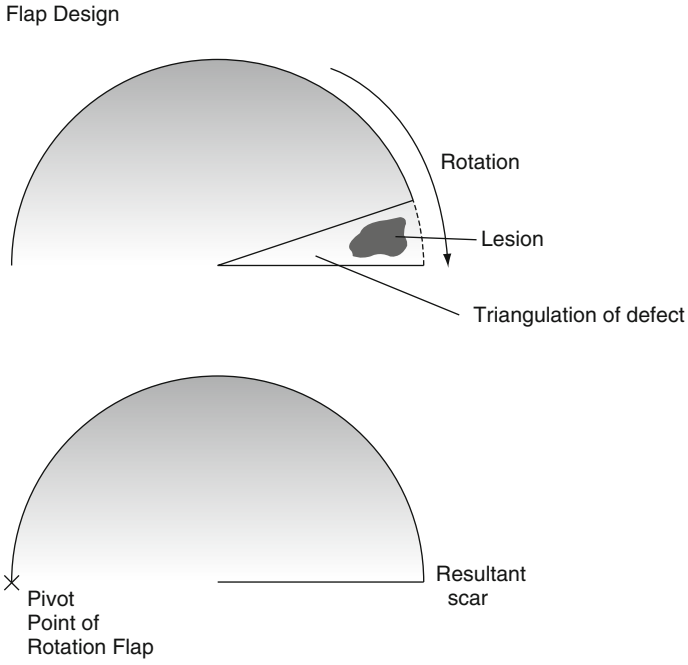

FIGURE 1.3. Rotation flap.

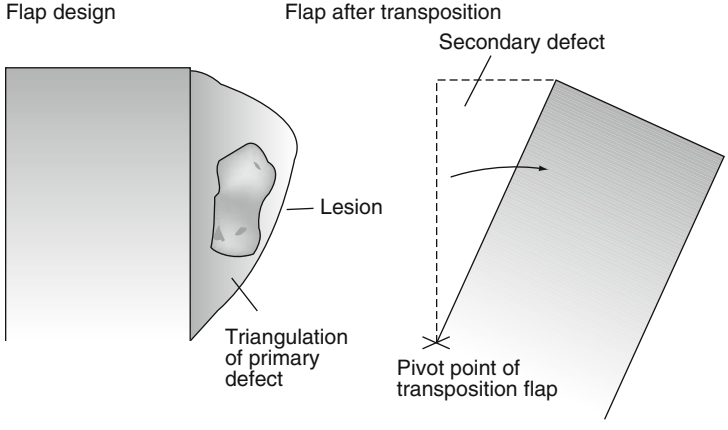

FIGURE 1.4. Transposition flap.

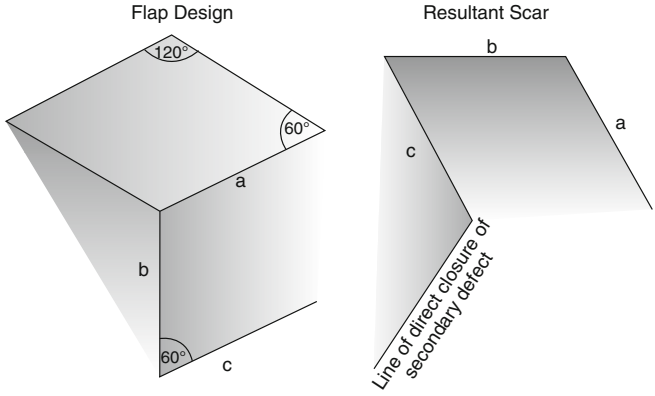

FIGURE 1.5. Rhomboid flap.

Free flap

– *Tissue that is transferred from one part of the body to another and is revascularized by microvascular anastomoses to recipient vessels.*

Chimeric flap

– *A flap comprising of separate components ultimately supplied by the same source vessel.*

Delay

– *A planned initial manoeuvre to partially interrupt the blood supply of a flap before moving it to a new position at a later date. This facilitates the opening up of "choke" vessels, reorientation of existing flap vessels and the sprouting of new vessels within the flap which improves the flap's ultimate blood supply.*

Crane principle

– *A technique to convert an ungraftable bed into a graftable bed. It involves transferring a flap into the defect, and after a period of time returning the superficial portion of the flap to its original position, minimizing the aesthetic defect and allowing the remaining now graftable bed to be skin grafted.*

Z-plasty

– *A technique involving the transposition of two triangular flaps, allowing elongation, realignment, and breaking up of a straight scar (Figs. 1.6–1.8)*

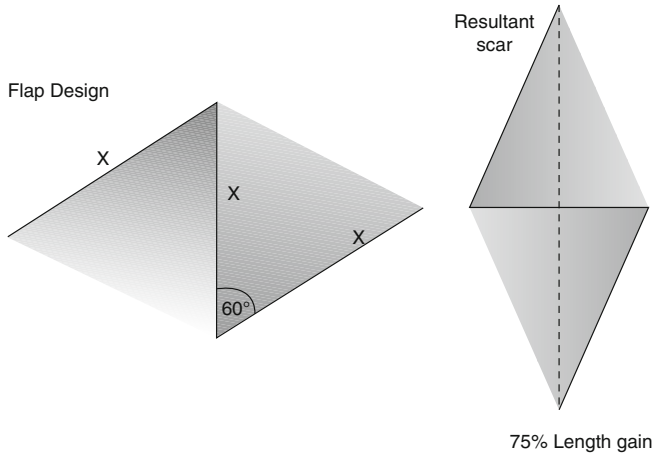

FIGURE 1.6. Classic Z-plasty.

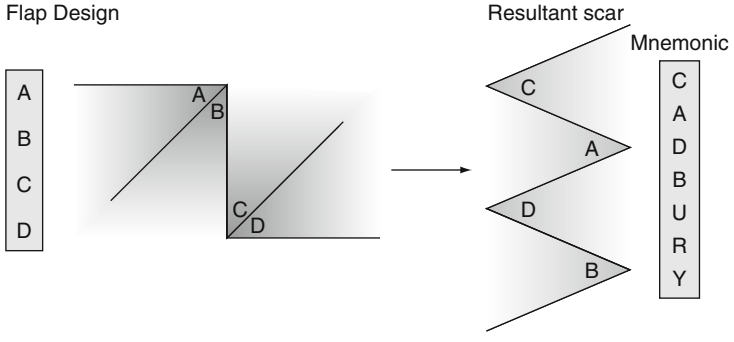

FIGURE 1.7. The 4 – Flap plasty.

1.7 CLASSIFICATION OF THEORETICAL LENGTH GAIN DEPENDING ON THE ANGLE OF DESIGN OF A Z-PLASTY

Z-plasty angle	Theoretical length gain (%)
30/30°	25
45/45°	50
60/60°	75
75/75°	100
90/90°	120

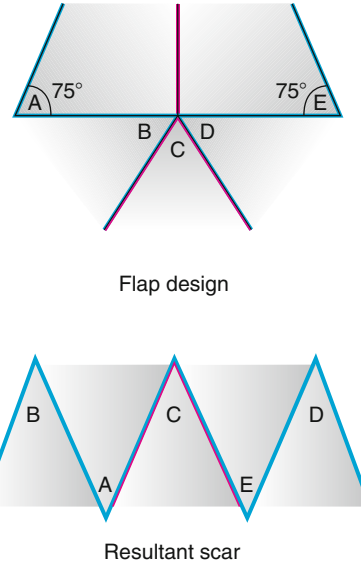

FIGURE 1.8. The 5 – Flap plasty or "Jumping Man" flap.

1.8 CLASSIFICATION OF FASCIOCUTANEOUS FLAPS: CORMACK AND LAMBERTY (FIGURE 1.9)

Cormack GC, Lamberty BG: The Arterial Anatomy of Skin Flaps. Edinburgh, Churchill Livingstone; 1986

Blood reaches the flap from fasciocutaneous vessels running from deep arteries of the body. Most flaps raised in a limb have a fasciocutaneous pattern of blood supply.

Type A
Multiple, unnamed fasciocutaneous vessels entering the base of the flap
E.g., Ponten lower leg flaps

Type B
Single fasciocutaneous vessel running along the axis of the flap
E.g., Scapular, parascapular flaps

Type C
Multiple perforating vessels from a deep artery in the septum between muscles
E.g., Radial forearm flap

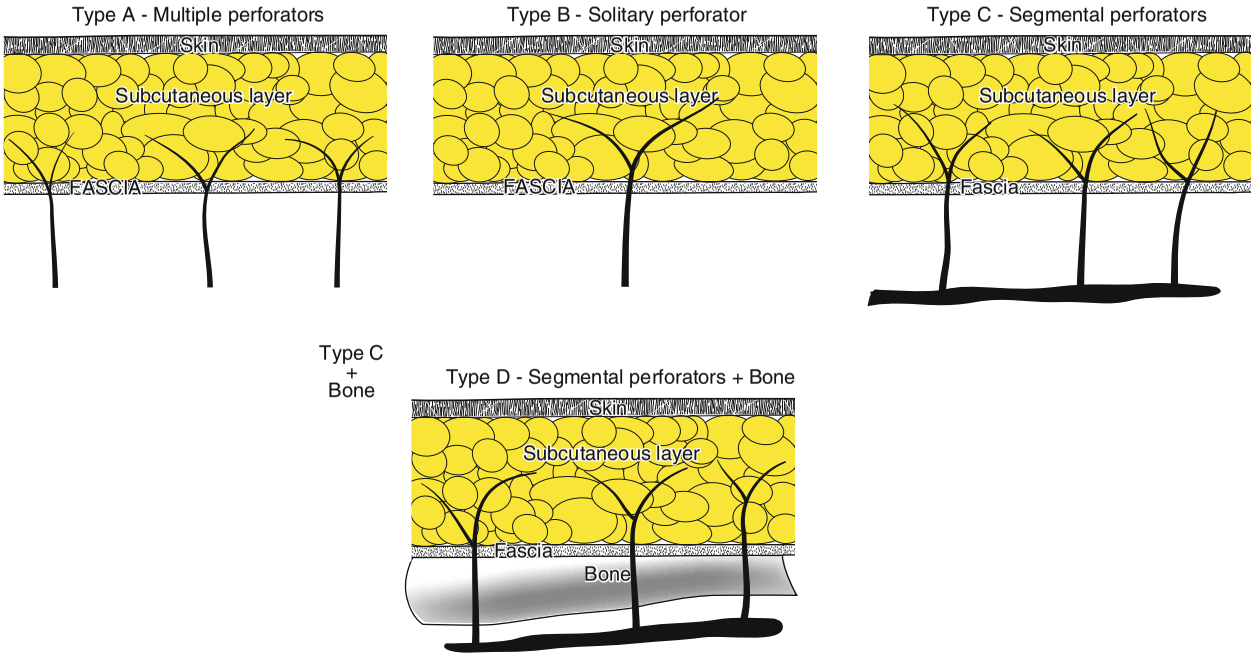

FIGURE 1.9. Classification of fasciocutaneous flaps – Cormack and Lamberty.

Type D
Type C+ Bone
E.g., Radial forearm flap with radius
Lateral arm flap with humoral lateral supracondylar ridge

1.9 CLASSIFICATION OF FASCIAL AND FASCIOCUTANEOUS FLAPS: MATHES AND NAHAI (FIGURE 1.10)

Mathes SJ, Nahai F. Reconstructive surgery: Principles, Anatomy, and Technique. New York, Churchill Livingstone; 1997

Type A	Direct cutaneous pedicle
Type B	Septocutaneous pedicle
Type C	Musculocutaneous pedicle

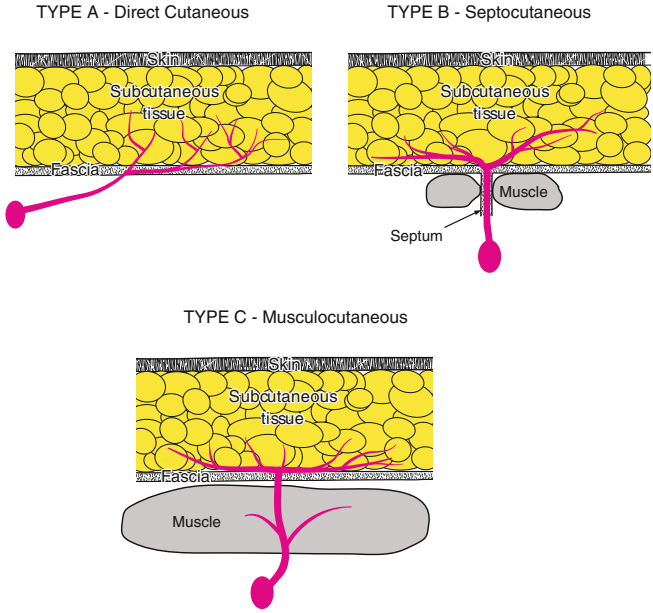

FIGURE 1.10. Classification of fascial and fasciocutaneous flaps – Mathes–Nahai.

1.10 CLASSIFICATION OF MUSCULOCUTANEOUS FLAPS: MATHES AND NAHAI (FIGURE 1.11)

Mathes SJ, Nahai F. Classification of the vascular anatomy of muscles: experimental and clinical correlation. Plast Reconstr Surg 1981;67:177

Based on perforators that reach skin through muscle

Type I
One vascular pedicle nourishes the whole flap (Gastrocnemius, Tensor fascia lata, Abductor digiti minimi)

Type II
Dominant vascular pedicle with additional minor vascular pedicles (Trapezius, Gracilis)

Type III
Two dominant vessels (Rectus abdominus, Gluteus Maximus, Serratus, Temporalis)

Type IV
Segmental supply (Sartorius, Tibialis anterior, Flexor hallucis longus)

Type V
Dominant pedicle but alternative minor pedicles which can support the flap (Latissimus Dorsi, Pectoralis Major)

1.11 CLASSIFICATION OF VENOUS FLAPS: THATTE AND THATTE (FIGURE 1.12)

Thatte MR, Thatte RL: Venous flaps. Plast Reconstr Surg 1992;91:747
A small artery may run with a vein
Flaps are based on a venous pedicle
E.g., Saphenous flap based on the short saphenous vein applied to knee defects

Type I – Single venous pedicle
Type II – Bipedicled venous flap
Type III – Arteriovenous venous flap

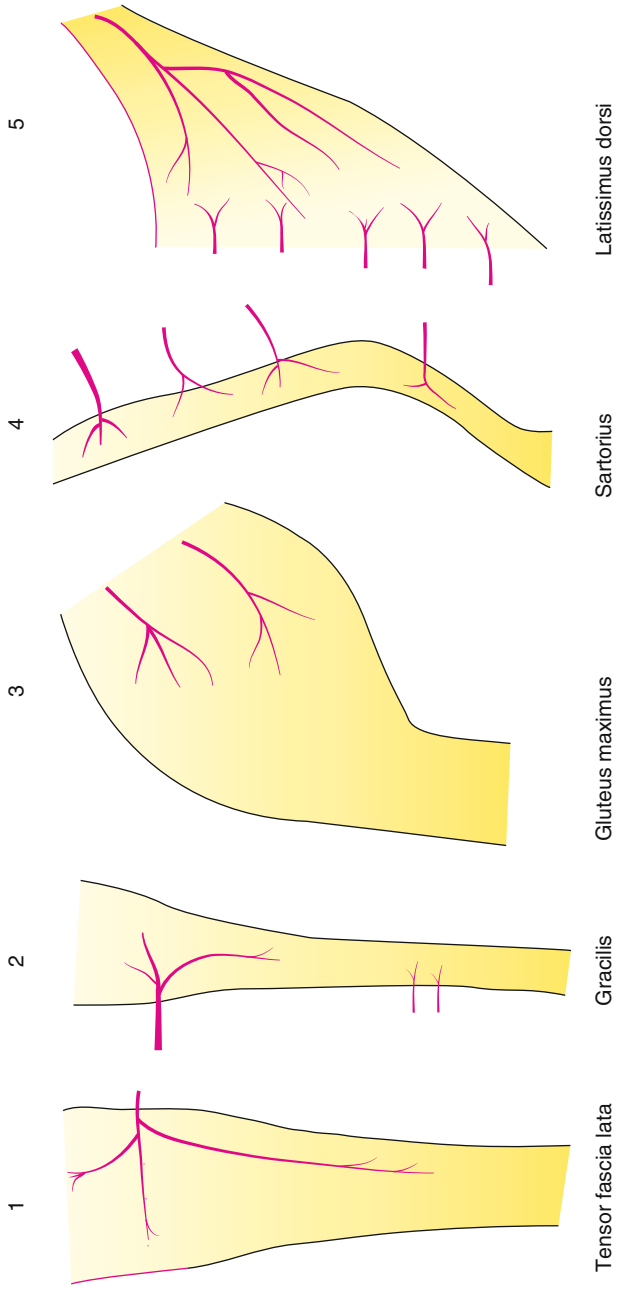

FIGURE 1.11. Classification of musculocutaneous flaps – Mathes–Nahai.

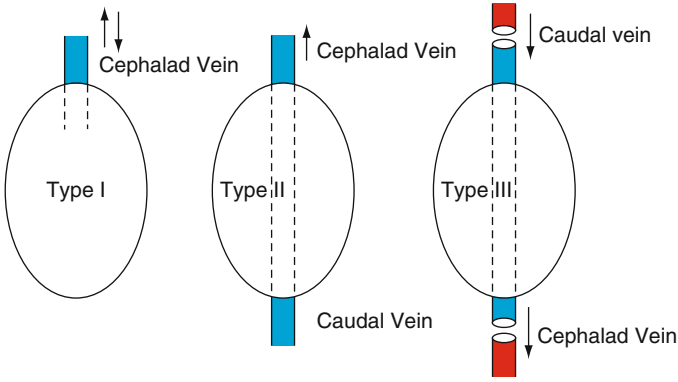

FIGURE 1.12. Classification of venous flaps – Thatte and Thatte.

1.12 CLASSIFICATION OF TYPES OF TRANSPLANT

Autograft
Allograft
Isograft
Xenograft

Heterotopic transplant
Orthotopic transplant

Autograft
– *Tissue transplanted from one site to another within the same individual*

Allograft
– *Tissue transplanted between unrelated individuals of the same species*

Isograft
– *Tissue transplanted between genetically identical individuals*

Xenograft
– *Tissue transplanted between different species*

Heterotopic transplant
– *Transplantation of tissue into an anatomically different site*

Orthotopic transplant
– *Transplantation of tissue into an anatomically similar site*