A NEET SS (SURGERY) PREPARATION COURSE
BY MARROW, WITH A TEAM OF SELECTED
SUPER-SPECIALITY FACULTY

SURGERY NEET SS

PLASTIC SURGERY

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CONTENT

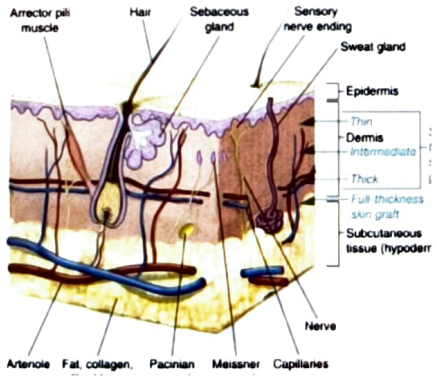
SKIN AND SKIN GRAFT

Embryology & function of skin 00:00:37

Largest organ (15% of adult body weight)
Starts developing from 4th week IUL : Differentiates from ectoderm (forms epidermis) & mesoderm (forms dermis).
Teeth & hair follicles, derived from skin(Ecto & mesoderm).
Toe nails & finger nails also derived from skin (Ectoderm).
Epidermal appendages : Hair follicles, sebaceous, sweat, apocrine glands.

Functions of skin :
Physical protection.
Protection against UV light.
Protection against microbial invasion.
Prevention of fluid loss.
Regulation of temp.
Sensation.
Immunological surveillance.

Anatomy of skin 00:02:05



Epidermis :
Stratified squamous epithelium.
Ectodermal in origin.
Keratinocytes are predominant cells.
Substratified into 5 layers.
Varying thickness :

Average thickness : 100micrometer.

Thickness in eyelid : 50micrometer but in palms & soles : upto 1mm.

Layers of epidermis :

Stratum Germinativum : Actively proliferating layer, contains melanocytes, linked to basal lamina.

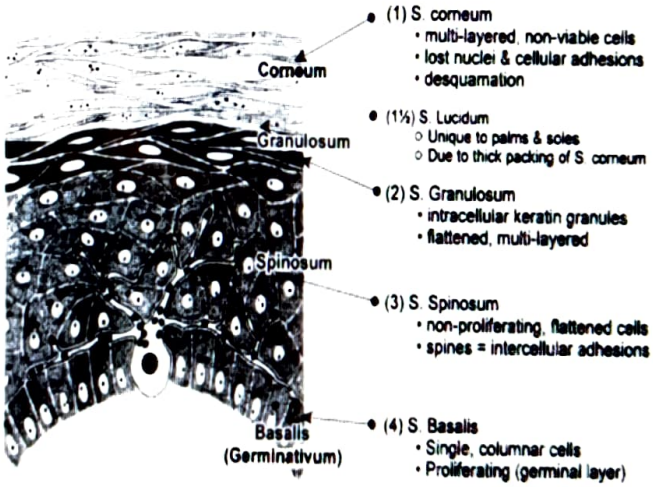
Stratum Spinosum : Large Keratinocytes → cytokeratin → tonofibrils → desmosomes (Helps in adhesion).

Also called as prickle skin layer.

Stratum Granulosum : Mature Keratinocytes containing Keratohyalin granules. Protein synthesis site.

Stratum Lucidum : Only in palm and soles.

Stratum Corneum: Non viable cells, protection & insulation.



Dermis :

Mesodermal origin.

95% of skin thickness.

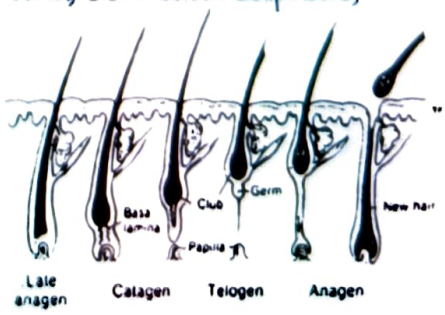
Fibroblasts – dominant cell type. Others : mast cells.

Constituents : Collagen TI (mature) & T3(immature), Elastin.

Ground substance : Hyaluronic acid, Dermatan Sulphate, Chondritin sulphate.

Layers of dermis :

Papillary dermis : Loosely arranged collagen fibers, provides nutrients & heat exchange.



Reticular dermis : Dense irregular collagen & dermal elastin.

2 horizontal plexuses of vessels connected by bridging vessels

traverse the dermis.

Appendages :

- Hair follicles :

Parts : Medulla, cortex, cuticle.

Inner root sheath (superficial)

Vs outer root sheath (deep).

Growth phases - Anagen (growing 90%)/ Catagen (regressing 1-2%)/ Telogen (resting phase 10-12%).

- Glands :

Eccrine : Palm, sole, axilla (absent in lips, penis, clitoris, labia minora, areola).

Apocrine : Axilla, eyelid (moll), groin, areola.

Sebaceous : Produce sebum, present on the forehead, nose, cheek, mostly contain Keratin.

Skin grafts basics 00:15:27

Definition :

Complete detachment of a portion of skin from a donor site & transferring to a host bed where a new blood supply is acquired.

History :

Origin : India, approximately 3000 years ago for nasal reconstruction in tile maker caste.

Reverdin 1869 : Pinch graft.

Ollier 1869, Thiersch 1871 : Split thickness graft.

Wolfe and Krausse : Full thickness graft.

Sir Astley Cooper : In 1817, used skin graft to cover an amputated thumb.

Important aspects :

- Thickness varies region wise.
- Thickest - trunk, palm, sole.
- Thinnest - eyelids, postauricular.
- Children & elderly - thin in general.
- Dermis thins after 4th - 5th decade.

- men have thicker skin.

Types of grafts 00:21:12

As per donor :

1. Autograft : donor & recipient is same individual.
2. Allograft : donor & recipient of same species.
3. Xenograft : donor & recipient of different species.
4. Isograft : donor & recipient genetically identical - twins.

As per thickness of skin :

1. Split thickness (STSG) :

   Epidermis with variable amount of dermis.

   Also known as partial thickness skin graft.

- Thin - 0.15 - 0.3mm.
- Intermediate - 0.3 - 0.45mm.
- Thick - 0.45 - 0.6 mm.

   Repeat graft extraction can be done from thicker areas.

   Epidermal grafting - Commonly used in vitiligo surgeries.

2. Full thickness (FTSG) : Complete dermis included.

   Repeat graft extraction can not be done.

Contraction of grafts 00:28:53

1. Primary contraction :

   At time of harvest.

   Elastin mediated

   More in FTSG (~40%)

   STSG - medium: 20%, thin: 10%

2. Secondary contracture :

   During healing at wound bed.

   myofibroblast mediated.

   more in STSG.

In cases, requiring large areas to be grafted, STSG preferred as large amount of FTGS cannot be harvested.

But in cosmetic cases, FTGS preferred as to avoid secondary contracture and thus disfigurement.

	Advantages	Disadvantages
STSG	Graft take more reliable. Donor heals in 7-14 days.	more wound contraction. Does not grow. Not durable. Minimal hair growth/ sweating.
FTSG	Less scar contraction. Grows with age. Better match. Hair and glands normal. once innervated.	Graft take less reliable. Donor needs primary closure or STSG.

Recipient sites 00:35:51

- Suitable sites :
  muscle, fascia, fat, periosteum, perichondrium, paratenon, granulation tissue.
- Unsuitable sites :
  Bare cortical bone/tendon/cartilage, irradiated tissue, necrotic or infected tissue.

Phases of graft take/ Revascularisation 00:38:45

1. Imbibition :
0-48 hrs.
Ischemic/ anaerobic phase.
Nourishment by diffusion.
Graft appears edematous & white.
Keeps graft moist and capillaries patent.
Attachment by fibrin only.

2. Inoculation :
No more valid.
Kissing capillaries.
Unidirectional angiogenesis at fibrin interface.
48 to 72 hours, microvascular growth of capillary-sized vessels (averaging 10–11 μm in diameter).
Peak in vessel density - Day 7

3. Revascularisation :

Angiogenesis established in conduits : 3 methods :
Inosculation, reangiogenesis, neovascularisation.
Lymphatic drainage established, edema resolved.
Graft appears pink.
Collagen links form between graft and bed.
mediated by mmp2.

4. Cellular hyperplasia :
After 1-2 weeks.
Epidermis thickens 7-8 fold.
Scaling and crusting.
Returns to normal by 4 weeks.

5. Maturation / Remodelling :
Occurs by interaction of graft and wound bed.
Secondary contraction is seen.
Pigmentation : FTSG better match, STSG may develop hyperpigmentatation, sun avoidance x 6 months.
Reinnervation : starts in 4-5 weeks, complete by 12-24 months, FTSG>STSG.
Sequence of return of sensation : Pain – light touch – temperature.
Care regarding thermal injury necessary in early days as temperature sensation returns last.

Sites of harvest 00:47:57

- STSG

1. Medial Thigh as cosmetically less disfiguring.
2. Buttocks
3. Scalp
4. Back

- FTG

1. Post Auricular
2. Groin
3. Supra Clavicular area
4. Inner side of arm

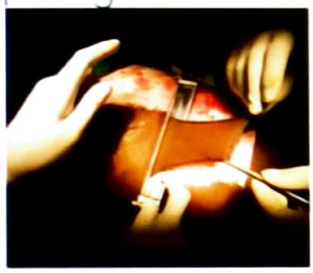
Graft harvesting 00:50:07

FTSG :
Free hand scalpel.

Template used.

Planned oversized to accommodate primary contraction.

Defat before placement.



STSG :

Instruments

Handheld knife : Humby, Goulian.

Dermatome : drum – Padgett,

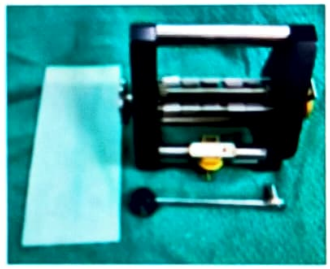
Reese air / electric powered Bleeding patterns.

Tiny punctate bleed closely placed – thin STSG.

Widely spaced bigger bleeding points – thick STSG.

Graft expansion

00:54:19



- Meshing :

Manual or mesher.

1:1.5 – usual, 1:9 maximum.

Allows drainage of exudate & blood.

Cobble stone appearance.

Significant contraction, so avoid using over joints.

- Pinch graft :

Graft divided into tiny pieces.

- Meek Island Grafting :

Special dermatome and p

refolded gauze used.

Skin graft cut into pieces using cork plates & then rolled into a machine placing onto a prefolded gauge.

On opening the gauge, islands of separated skin are present, which then placed on the wound surface cause skin regeneration in between.

Expansion ratio 1:9.

- Microskin grafting :

Sheet graft minced with Tanner-Vandeput dermatome.

Expansion ratio 1:10.

- Intermingled transplantation :

Autograft alternating with allograft.

Fixation of graft & Causes of graft failure

01:02:24

- Hematoma (mc).
- Infection (and mc).
- Seroma.
- Movement.
- Excess pressure.
- Arterial insufficiency.
- Venus congestion.
- Lymphatic stasis.
- Upside down graft placement.
- Poor fixation.

Tie over dressings :

Help immobile/fix the graft over the wound.

Used commonly for mobile areas, facial wounds.

Donor site healing & dressings 01:08:15

Donor site healing :

FTSG

- Primary closure
- STSG

STSG

Epithelial migration from appendages and edges.

Starts in 24 hrs, complete in 7-10 days, not durable.

Dermis does not regenerate.

Serial STSG can be harvested from donor with thick dermis

Donor site dressings :

Open – cheap, prolong healing, painful, infection risk.

Semiopen – Scarlet red, Biobrane, Vaseline gauze, Xerofoam.

Semi occlusive : Allevyn, Opsite, Tegaderm.

Occlusive – Duoderm.

Biologic – Amniotic meberane, cultured cells, allograft, xenograft, skin substitutes.

Allograft is revascularized before rejection, xenograft is rejected before revascularisation.

SKIN SUBSTITUTES AND WOUND DRESSINGS

Ideal wound dressing 00:00:54

Ideal wound dressing :

Protection of wound physically and microbiologically.
Non toxic and non allergenic.
Maintains humidity.
Removes excess exudate.
Allows gasseous exchange.
Removes necrotic material.
Promotes epithelialisation.
Promotes granulation.
Atraumatic application and removal.
Inexpensive with long shelf life.

Wound dressing : Classification 00:04:14

Could be temporary or permanent :

1. Temporary biologic dressings :
   - Organic.
   - Synthetic.
2. Permanent biologic dressings :
   - Autograft.
   - Skin substitutes.

Classification (synthetic) :

1. Low adherent dressings :
   Tulles (open weave soaked in paraffin).
   Textiles (mepitel).
   Perforated plastic films (Telfa).
2. Semipermeable films :
   Permeable to gas and vapour (not to liquids and bacteria).
   Opsite and tegaderm with adhesive (polyurethane).
   Omiderm is without adhesive.

3. Hydrogels :
   Insoluble polymers with 96 % water.
   Donate water and keep wound moist (natural autolysis).
   Aquaform, Intrasite.
4. Hydrocolloids :
   Sodium CMC, gelatin, elastomers.
   Forms a gel by absorption of wound exudate.
   Very commonly used hydrocolloid dressing : Aquacel.
5. Alginates :
   Derived from a brown seaweed.
   Absorbent.
   Adhere on non exudative wound.
6. Synthetic foams :
   Polyurethane or silicone.
   Heavily exudative wound.

Negative pressure wound therapy 00:09:44

Acts by mechanotransduction.
Decreases interstitial fluid content of wound.
Promotes granulation tissue.
Wound covered with open cell sponge, covered with a polyurethane adhesive film.
Pressure 120 mm of Hg for acute, 50 - 70 mm of Hg for chronic wounds.
Intermittent suction.

Contraindications :

- Malignancy.
- Untreated osteomyelits.
- Fistulae.
- Necrotic tissue.
- Ischemic tissue.

Organic wound dressing 00:11:39

1. Allograft skin :
- Live related (family members) : Banned in several

countries.

- Live unrelated (freshly harvested form donors) : fresh cadavers.
- Cadaveric unrelated :

Glycerol preserved after freeze-drying.

Glycerol preservation at – 80° C (may contain viable cells and can lead to rejection).

Irradiated.

Immunogenic.

- Alexander technique (sandwich).

2. Human amnion (readily available).
3. Porcine (replacement every few days).

Synthetic wound dressing

00:15:24

- Biobrane Bilaminate :

Semipermeable silicone sheet.

Embedded in nylon fabric with porcine collagen.

Acellular in nature.

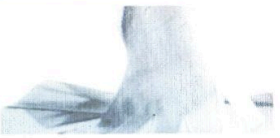
Provides good pain relief.

Good temporising measure to allow early physiotherapy.

Especially used in pediatric scalds, donor wounds.








Biograne gloves :

Advantages :

- Pain relief.
- Less chances of infection

Transcyte

00:17:09

Polymer membrane with neonatal fibroblasts.

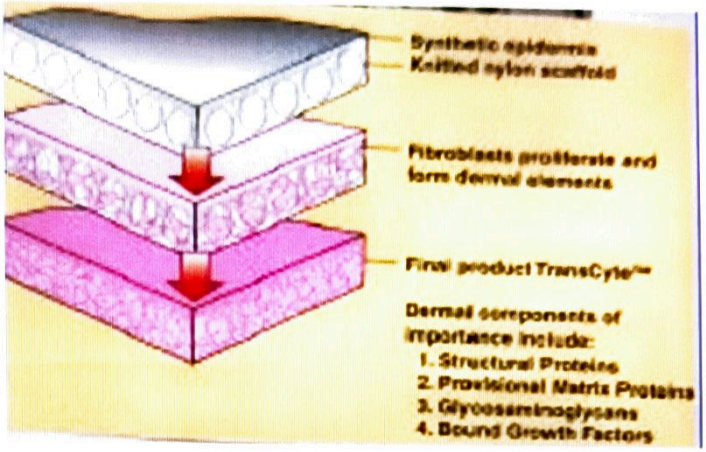
Grown on a nylon mesh with porcine collagen and bounded to a thin layer of silicone.

Fibroblasts secrete growth factors, collagen and proteins.

Frozen for storage.

Growth factors remain intact.

Acellular in nature.



Ideal skin substitute

00:18:16

Permanent.

No skin antigenicity.

Tissue compatibility.

Non toxic.

Permeable to water vapour.

Resistant to infection.

Adherence to wound surface.

Porosity.

Malleable.

Elastic.

Structural stability.

Smooth surface.

Tensile strength.

Ease of storage.

Economical.

Biodegradable.

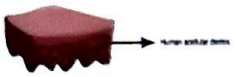
Common skin substitutes :

Permanently incorporated :

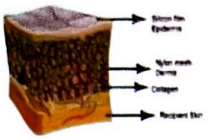
- Integra.
- Matriderm.
- Dermagraft.
- Cultured epithelial autograft.

(a) Acellular

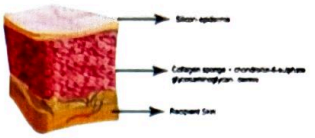
i. Alloderm®



ii. Biobrane®



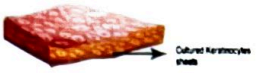
iii. Integra® DRT



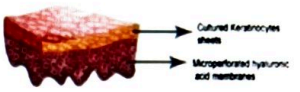
(b) Epidermal Autologous

i. Cell Spray

ii. Epicel

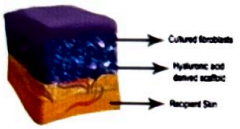


iii. Laserskin



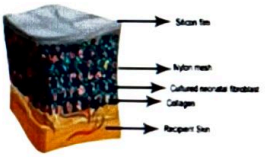
(c) Dermal Autologous

i. Hyalograft 3D

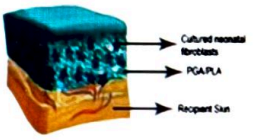


(d) Dermal Allogenic

i. TransCyte



ii. Dermagraft

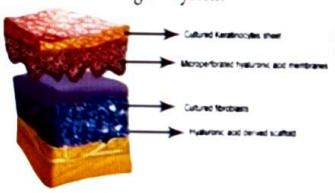


(e) Xenogenic Dermal

i. Permacol

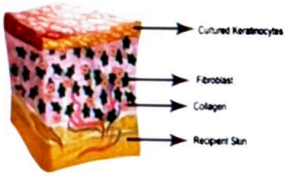
(f) Epidermal/ Dermal (Composite) Autologous

i. Tissue tech autograft system



(g) Epidermal/ Dermal (Composite) Allograft

i. Apligraf



Integra :

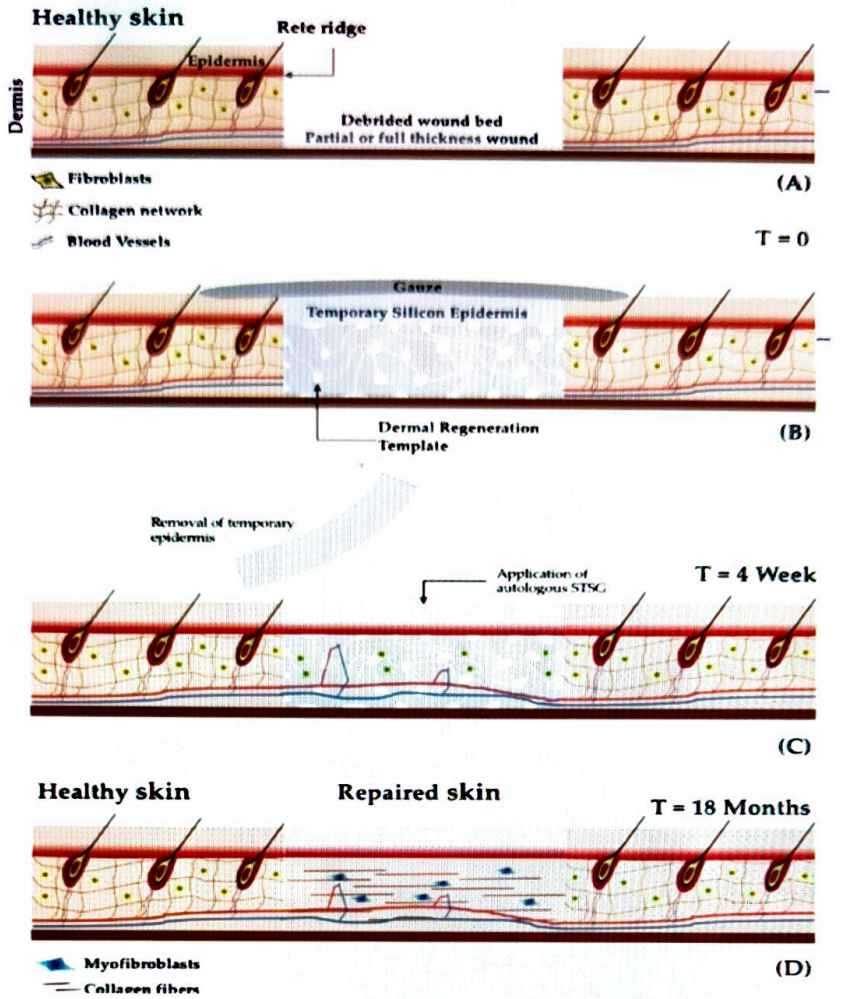
Epidermis is made of silicone.

Silicon : prevents moisture loss and granulation tissue formation on the surface.

C6S elastic city controls the degradation rate maintains and open poor structure.

Phases of healing :

- Imbibition (fibrin mediated).
- Fibroblast migration
  Occurs by day 7.
  Collagen production by 3 weeks.
- Neovascularistaion :
  Occurs by day 12.
  Remove superficial layer by day 28 & replaced with autologous epidermis..
- Remodelling.
- Used for challenging areas with NPWT.



matriderm :

1. Single layer dermal template :
   - Bovine dermal collagen.
   - Bovine nuchal ligament elastin.
2. Dermagraft :
   - Neonatal foreskin fibroblasts.
   - Seeded onto biodegradable PGA mesh.
   - Fibroblasts are viable after thawing.
3. Cultured epidermal autograft :
   - Keratinocytes cultured and sprayed.
   - Risk of contracture.

Couno technique

00:26:13

CEA on allograft.
Allograft is used till the cell is being cultured.
After revascularisation, removal of epidermis.
Spraying of CEA.

GENERAL PRINCIPLES OF FLAPS

Flap is a tissue that carries its own blood supply to its recepient area.

Blood supply of skin 00:02:30

Abundant supply : more than required for survival.
Skin has thermoregulatory & Immune response mechanism.

Epidermis : No blood vessels, depends on diffusion from dermis.

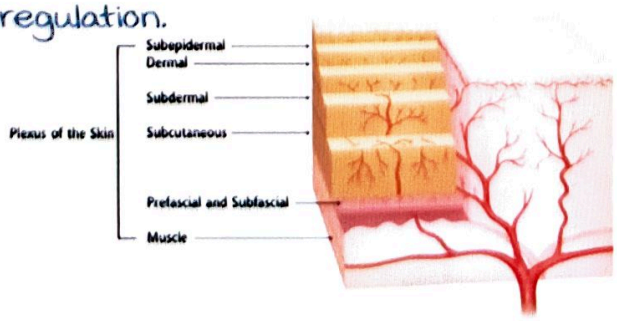
Deep vessels : From aorta/major vessels to various regions.

Interconnecting vessels :

- Fasciocutaneous/ Septocutaneous : From deep to skin directly via fascia, main supply of limbs.
- Musculocutaneous : Indirectly via muscular branches to skin,main arterial supply to torso.

Vascular plexus 00:05:54

1. Subfascial pleuxs : Under deep fascia.
2. Prefacial plexus : Superficial to deep fascia, predominant fasciocutaneous supply, limbs.
3. Subcutaneous plexus : At superficial fascia, predominant musculocutaneous, torso.
4. Subdermal plexus : From underlying plexus, main skin supply, dermal bleed in skin incisions.
5. Dermal plexus : Arterioles based, thermoregulation.
6. Subepidermal plexus : Small vessels without muscles, nutrition and thermoregulation.



Angiosome concept

00:07:49

- Manchot : First studied in 1889.
- Salmon 1930, Tayler & palmer : Explained same.
- 3D block of a composite tissue supplied by a named artery.
- Anatomical territory : Area of direct supply before artery anastomoses with other vessel.
- Dynamic territory : Are into which fluoroscein staining extends after intravascular injection.
- Potential territory : Area which can be included if delayed.
- Choke vessels : Bridge between 2 anatomical territories and are bidirectional.

Example of angiosome concept :

Tram flap :

1. Zone 1 : DIEA direct supply.
2. Zone 2 & 3 : Controversial placement.
   - Hartramph : Zone 2 is across & zone 3 is lateral to Zone 1.
   - Holm : Opposite.
   - Skin lateral to Zone 1 is territory of SCIA : 1 Choke vessel.
   - Skin across zone 1 is territory of same side : DIEA.
3. Zone 4 :
   - Farthest from zone territory of contralateral SCIA.
   - 2 choke vessels encountered.

Taylor's observations :

Arterial :

- Travel with nerves.
- Law of equilibrium : If one is small , neighbour will be large.
- Travel from fixed to mobile tissue.
- Fixed destination but varied origin.
- Size and orientation is product of growth.

Venous :

- Avalvular and valved veins link to maintain law of

equilibrium in the venous network.

- Directional veins are valved.
- Avalvular veins accompany choke vessels.
- Superficial veins follow nerves.
- Perforating veins follow perforators.

Control of blood flow 00:18:13

Depends on various factors :

1. Pressure in blood vessels :
   Myogenic theory (Bayliss) :
   - Increased intraluminal pressure--> Constriction.
   - Decreased pressure --> Dilation.
2. Neural innervation :
   - Sympathetic innervation : Arterioles,AVA, pre capillary sphincter.
3. Humoral factors :
   - Vasoconstriction : Epinephrine, norepinephrine, Serotonin, Thromboxane A2, Prostaglandin F2 alpha.
   - Vasodilation : Low oxygen, High CO2, acidosis, histamine, bradykinin, prostaglandin E1.
4. Temperature : Increase flow via AVAs.

Microcirculation 00:20:01

Terminal arterioles are found in reticular dermis.
The pre capillary sphincter is the last part of the arterial tree containing muscle within its wall (regulated blood flow).
AVAs connect arterioles to efferent veins (bypass the capillary bed). :

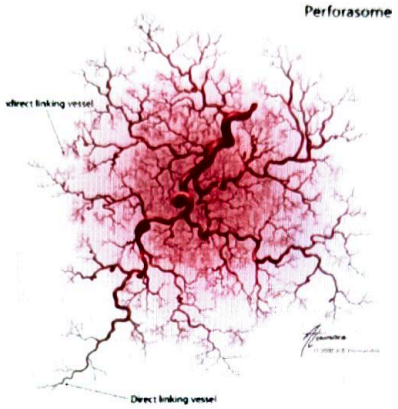
- Indirect AVAs : Convoluted with neural supply.
- Direct AVAs : Less convoluted.

Perforasome & Delay phenomenon 00:20:57

- Saint-Cyr et al advanced the angiosome concept to provide additional and practical insight into vascular territory and flow characteristics important for flap

design.

- Studied 3D & 4D blood flow through perforators and mapped out the territory.
- Connections between perforasomes through direct (fascial) and indirect (subdermal) vessels.



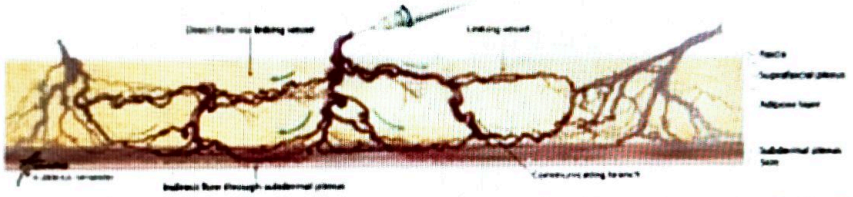


Fig. 3. Interperforator flow occurs by means of direct and indirect linking vessels. Direct linking vessels communicate directly with an adjacent perforator to maintain perfusion, and travel within the suprafascial and adipose tissue layers. Indirect linking vessels communicate with adjacent perforators by means of recurrent flow through the subdermal plexus. Communicating branches between direct and indirect linking vessels are also seen and help maintain vascular perfusion in case of injury.

Delay phenomenon :

Any proper manouvre to increase flap survival.

History : Tagliacozzi's nasal reconstruction flap 2: 1.

Delay theories :

- Increased axiality of blood flow :
  Division of random vessels improves axiality.
- Tolerance to ischemia :
  Accustomed to hypoxia.
- Sympathectomy vasodilation theory :
  Division of sympathetic fibres
- Intraflap shunting hypothesis.
- Hyperadrenergic state :
  After first stage, rise in vasoconstrictors--> they return to normal beofre second stage.
  After second stage, another rise but not enough to cause ischemia.

- Unifying theory (pearl 1981).

Classification of flaps :

5C's :

1. Composition.
2. Circulation.
3. Contiguity.
4. Contour.
5. Conditioning

Flap classification : Composition 00:30:03

1. Cutaneous (random flaps).
2. Fasciocutaneous :
   Further classified by Cormack Lamberty : Skin, subcutaneous tissue, fascia.
3. Fascial (Adipofascial).
4. Musculocutaneous.
5. Muscle only.
6. Osseo cutaneous. : Free fibula flap.
7. Osteomyocutaneous.
8. Osseous.
9. Others : Omental, intestinal.

Flap classification : Contiguity 00:32:28

1. Local : Adjacent to defect.
2. Regional : From same region as defect.
3. Distant : From distant site, remain attached to origin, can be pedicled or free.

Flap classification : Circulation 00:33:40

1. Random (Skin only) : No named or directional supply.
   - Depends on subdermal plexus.
   - Limited to 3 : 1 L : B ratio to be visible at the tip.
   - L : B ratio = 1 : 1 (limbs) to 6 : 1 (face).
2. Axial :

- Direct (skin) : Named vessel subcutaneously along axis, can include a random segment at distal part.
- Flaps containing muscle or fascia : mathes Nahai & Cormack lamberty classification.

Cormack & Lamberty classification (Fasciocutaneous) :

Type A :

- Multiple non named FC vessels entering base of flap.
- Eg : Ponten super flaps of lower limb.

Type B :

- Single FC vessel along axis.
- Eg : Scapular / para scapular flap, perforator based flaps of lower leg.

Type C :

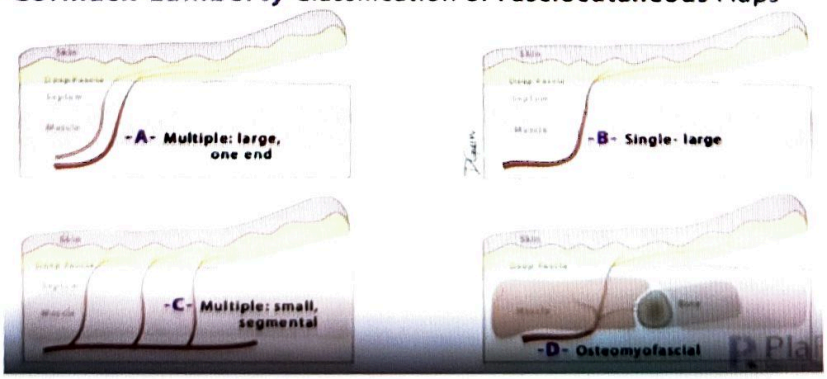
- Multiple small vessels from deep artery along fascial septum.
- Eg : RAFF, Lateral arm flap.

Type C with bone :

- Originally type D, RAFF with radius.

Type	Vascular Anatomy
A	Multiple, codominant fasciocutaneous perforators
B	Single, dominant fasciocutaneous perforator
C	Single or multiple septocutaneous perforators
D	Inclusion of other structures like bone and muscle along the source vessel

Cormack-Lamberty Classification of Fasciocutaneous Flaps



Mathes & Nahai (Skin flaps) :

Type A :

- Direct cutaneous pedicle.
- Eg : Groin, inferior epigastric , dorsal metacarpal artery flap.

Type B :

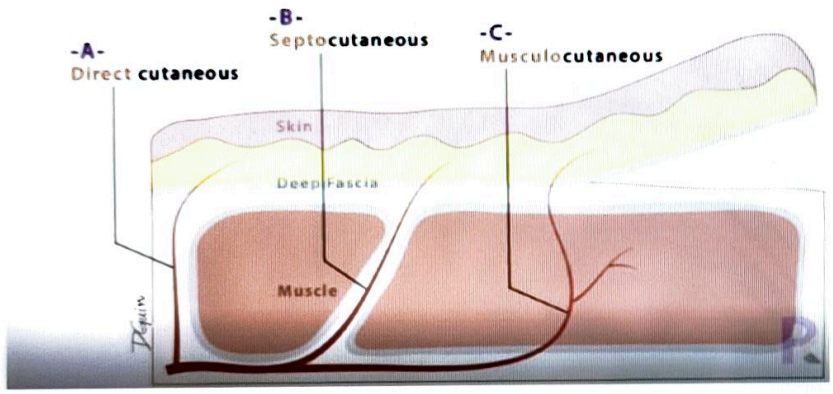
- Septocutaneous pedicle.
- Eg : Parascapular, scapular, lateral arm, PIA flap.

Type C :

- musculocuatneous pedicle.

Eg : median forehead, nasolabial, ALT flap.

Mathes-Nahai Classification of Fasciocutaneous Flaps



3. Musculocutaneous :

Perforators reach skin through the muscles, mainly torso.

Mathes & Nahai classification :

Type 1 :

- Single vascular pedicle.
- Eg : Gastrocnemius, TFL, Abductor digiti minimi flap.

Type 2 :

- Dominant pedicle and minor pedicles.
- Eg : Trapezius, soleus and gracilis.

Type 3 :

- Two dominant pedicles from separate regional artery.
- Eg : Rectus abominis, pectoralis minor, gluteus maximus.

Type 4 :

- multiple segmental pedicles.
- Eg : Sartorius , tibilais anterior, long flexors, toe extensors.

Type 5 :

- One dominant secondary pedicles.
- Eg : Lattismus dorsi, pectoralis major.

4. Venous :

Based on venous supply, many have small artery alongside, not universally accepted, can congest post op .

Eg : saphenous flap.

Thatte classification :

- Type 1 : Single venous pedicle.
- Type 2 : Venous flow through flaps.
- Type 3 : Fed by AV anastomosis proximally , drained by vein distally.

Additional classification (based on blood supply) :

Pedicled and free flaps :

1. Pedicled :

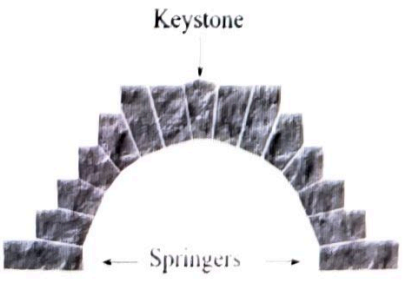
   Attached to their native pedicle and limited in the arc of rotation (island pedicled increases arc of rotation).

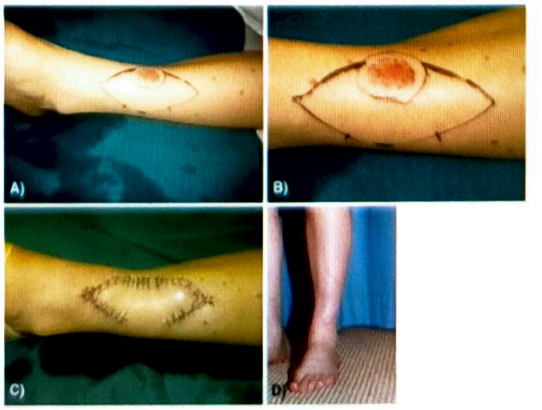
2. Free :

   Allow the freedom of transfer.

Perforator flaps and propellar flaps :

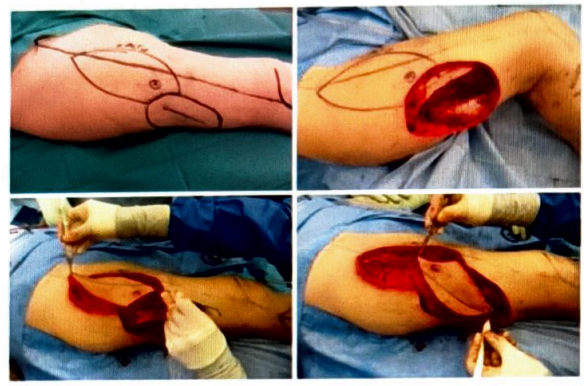
1. Perforator flaps :
   - Perforating artery from the named vessel include the perforasome.
   - Hand held doppler.
   - Can include the named vessel to increase the length of the pedicle.
   - Keystone perforator island falp : Describe by Behan.





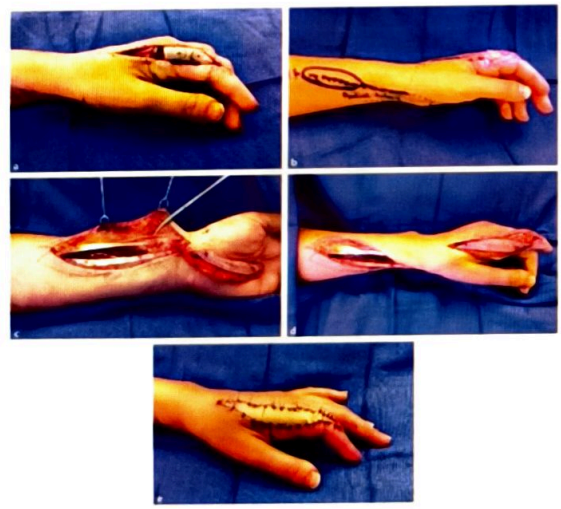
2. Propellar flaps :
   - Propeller flaps are elevated as island flaps with a pedicle at the centre allowing its rotation at 90°.

- Resembles a propeller and rotates on its central axis to cover the defect.



modifications of blood flow :

- Reverse flow flap : Native direction of flow is reversed.
- Reverse radial forearm flap.
- Venous flow through flap : Skin, subcutaneous tissue, plexus of veins.
- Supercharged flap : Additional arterial inflow or venous outflow.



Crane principle :

To transform ungraftable bed into graftable.

- Stage 1 : Flap placed into the defect.
- Stage 2 : After vascularization of bed flap repositioned to donor and primary defect covered with skin graft.

SCALP VS SC.

Flap classification : Conditioning/manipulation 00:52:52

Expansion of flaps :

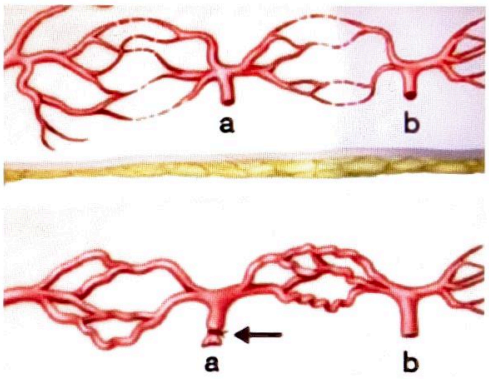
Greater reach and coverage.

Also neovascularisation.

Delay phenomenon :

Pre operative maneuvre to increase blood flow.

Induces sub lethal ischemic insult to stimulate vessel dilation, ischemic preconditioning and neovascularisation.



Geometry :

1. Langer : Demonstarted skin tension line along longitudinal axis of elliptical wounds on skin of cadavers by circular awl.
2. Borges : Gave 36 terms for skin lines.

RSTL : Parallel to wrinkles, perpendicular to underlying muscles.

LME : Perpendicular to RSTL, parallel to muscles beneath.

Orientation of incisions :

Based on pull of underlying muscles.

made parallel to RSTL and perpendicular to LME.

made parallel to direction of hair growth.

Pinch test :

- Skin either side of planned incision is pinched.
- Transverse fold : Correct orientation.
- Sigmoid fold : Incorrect orientation.

Flap classification : Contour (movement) 00:58:38

As per the way they are transferred to defect :

1. Advancement.