REHABILITATION MANAGEMENT OF BURN INJURY

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PROBLEM PADA LUKA BAKAR	Nyeri
	Kontraktur kulit dan sendi
	Perubahan penampilan & fungsi
	Pada ekstremitas superior : terjadi masalah pada aktifitas sehari hari (ADL), motorik halus
	Pada ekstremitas inferior : terjadi masalah pada ambulasi
	Masalah psikologi : terjadi stress emosional berat, perasaan rendah diri dan kehilangan kepercayaan diri

Contracture problems

ADL problems

Ambulation problem

TUJUAN PENANGANAN REHABILITASI MEDIK LUKA BAKAR

Tujuan setelah resusitasi:

- Mencegah infeksi
- Menurunkan nyeri
- Mencegah kontraktur
- Mempersiapkan grafting
- Mencegah hipertrofi skar
- Menjaga fungsi dan kekuatan

Tujuan Jangka Panjang

- Mencegah disabilitas
  Meminimalkan derajat disabilitas
  Memaksimalkan fungsi yang ada
  Mencapai kapasitas kemandirian maksimal

Rehabilitasi Periode akut

- Mempertahankan fungsi pernapasan
- Merawat luka dan menghindari terjadinya infeksi
- Kontrol terhadap terjadinya edema
- Mempertahankan luas gerak sendi
- Mempertahankan serta memelihara kekuatan otot dan *endurance*
- Memotivasi keterlibatan pasien dan keluarga yang akan mendorong keberhasilan terapi

Rehabilitasi Periode Imobilisasi

- Memberikan program latihan untuk menghindari komplikasi imobilisasi lama seperti pneumonia dan kontraktur
- Merencanakan ortesa untuk melakukan *positioning* yang benar terutama pada luka bakar dengan atau tanpa *skin graft* yang melalui sendi
- Memberikan support psikologis pada pasien dan keluarga agar dapat melalui proses penyembuhan luka dengan baik dengan adanya jaringan parut dan atau *skin graft*

Rehabilitasi Periode Maturasi

- Meningkatkan kembali kekuatan otot dan *endurance,* serta memperbaiki ketrampilan dan koordinasi
- Meningkatkan kembali luas gerak sendi
- Mengusahakan *total contact* pada pemakaian ortesa
- Mengontrol terjadinya edema
- Meminimalkan terjadinya jaringan parut yang hipertrofi
- Membantu pasien kembali pada kegiatan sosial dan vokasional/pekerjaannya

STAGE	TIMESCALE	PROCESS	SIGNS AND SYMPTOMS	TREATMENT
Inflammation	0-5 days	Vasoconstriction followed by vasodilatation and influx of inflammatory mediators and WBCs. Increased capillary permeability. Exudate leaks into tissues. Pus may be produced.	Redness, Heat, Swelling, Pain	Reduce heat and oedema and pain. Prevent infection and disruption of wound. (immobilisation, positioning, splinting)
Proliferation (fibroplasia)	Begins day 3-5. Lasts 2-6 weeks.	Fibroblasts synthesize collagen. Laid down haphazardly. Angiogenesis continues.	Moist red raised tissue over wound	Early: positioning and immobilisation Later: gentle stress (splinting, exercise) Reduce oedema and prevent contracture
Remodelling (maturation)	Begins week 4-6. Lasts up to 2 years.	Synthesis of collagen balanced by degradation. Organisation of collagen fibres along lines of stress.	Wound closure Scar red and raised progresses to flat pale and pliable. Scar tissue tightens.	Optimise function Splinting Positioning Exercise Stretching Strengthening.

PROPER POSITIONING

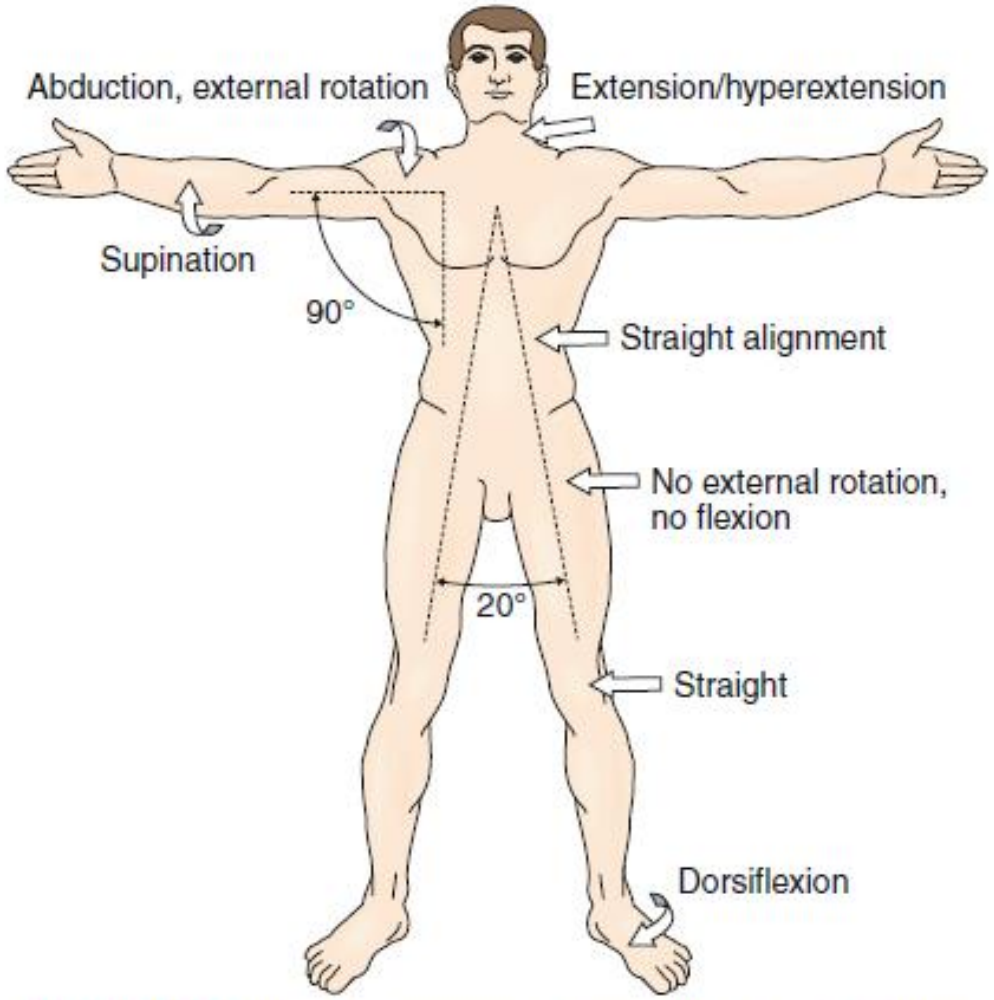
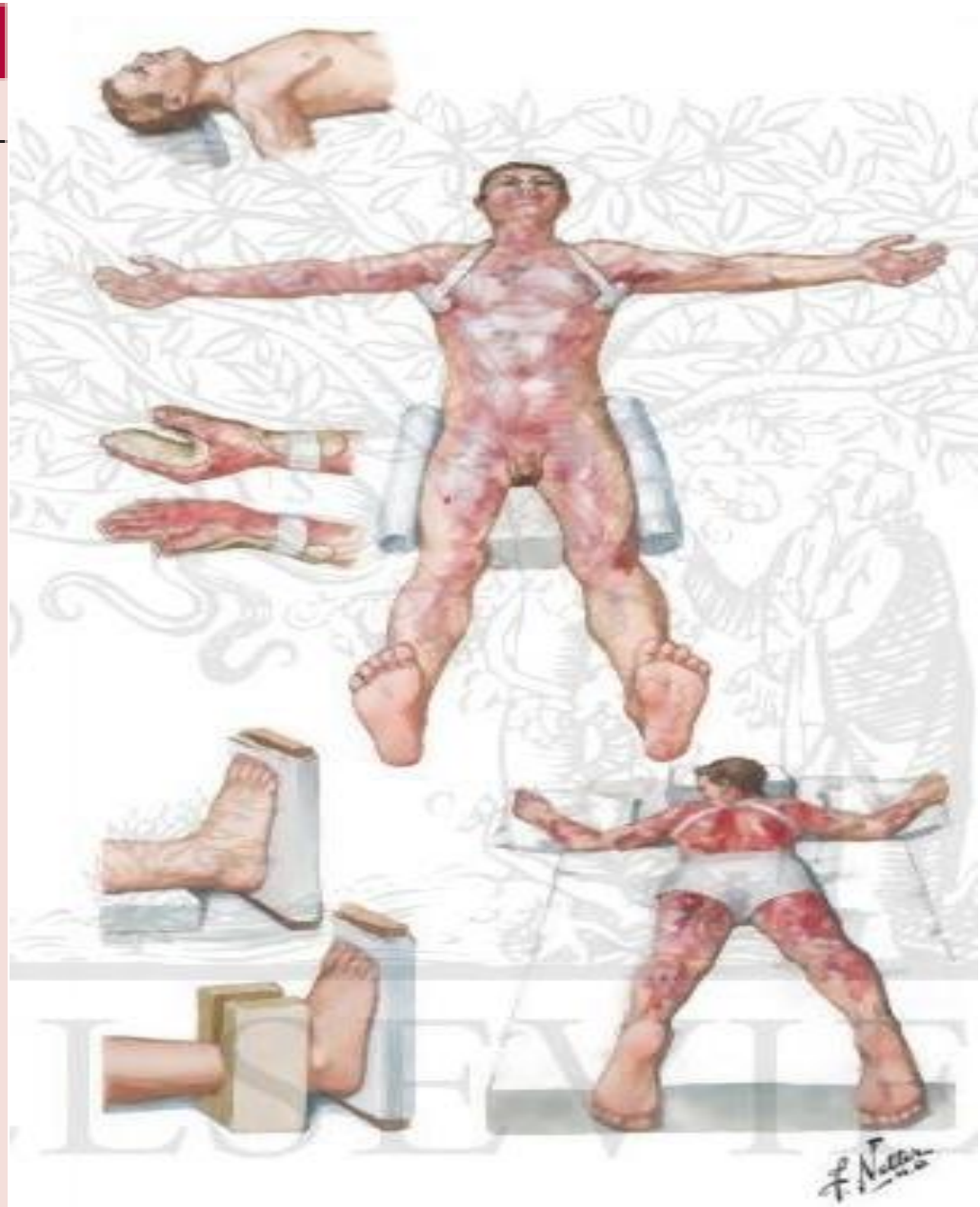


FIGURE 121.2 Optimal positioning to prevent burn contractures.

TABLE 43.3 Proper Positioning for Preservation of Function in Acute Burns

Joint/Body Region	Preferred Position	Positioning Devices
Upper Extremity and Trunk		
Neck	Slight extension	Neck collar Splint that conforms to the neck No pillows under the head
Axillae	Horizontal adduction 15 degrees Abduction 80 degrees	Airplane splint Wedge to positioning to abduction If rest of upper extremity involved Can support UEs: Bedside table Side boards/bedside extensions
Elbow	Extension 5 degrees	Arm trough splint Elbow extension splint
Forearm	Supination	Arm trough
Wrist	Neutral or slight extension	Wrist cock-up splint Part of resting hand splint
Hand	I, P joints: full extension MCP: 70–80 degrees flexion Abducted from palm Thumb opposition	Resting hand splint Soft web spacers Intrinsic plus hand splint C bar for thumb
Chest and trunk	Neutral with level hips	Figure of eight device to reduce protraction
Lower Extremity and Trunk		
Hip	Neutral extension Abduction 20 degrees	Wide soft straps to avoid frog leg position especially in children
Knee	Extension	Knee extension splint; immobilizer
Ankle	90 degrees That is neutral Dorsiflexion, plantar flexion Inversion/eversion	Posterior shell with ankle in neutral L/Nard; PRAFO-like devices
Foot	Neutral forefoot Supination/pronation; toes extended	



ANTIDEFORMITY POSITION

Location of burn	Contracture tendency	Antideformity position / Splint
Anterior neck	Neck flexion	Remove pillows, half-mattress, neck collar
Axilla	Adduction	120^0 abduction + slight exorotation, splint
Anterior elbow	Flexion	Elbow extension splint in 5 – 10^0 flexion
Dorsal wrist	Wrist extension	Wrist support in neutral position
Volar wrist	Wris flexion	Wrist cock-up splint
Hand dorsal	Claw hand deformity	Hand splint with MCP joint in 70 – 90^0, IPs fully extended, first web open, thumb in opposition
Hand volar	Palmar contracture, Cupping of hand	Palmar extension splint, MCPs in slight hyperextension
Hip anterior	Hip flexion	Prone position, weight on thigh in supine, knee immobilizer
Knee	Knee flexion	Knee extension position, prevent external rotation
Foot	Foot drop	Ankle at 90^0 on foot board or splint

PROGRAM REHABILITASI

Program latihan
- Latihan pasif
- Latihan aktif dibantu
- Latihan aktif
- Latihan luas gerak sendi
- Stretching
- Latihan mobilisasi dan ambulasi

Terapi okupasi

Pemakaian ortesa atau *splinting*

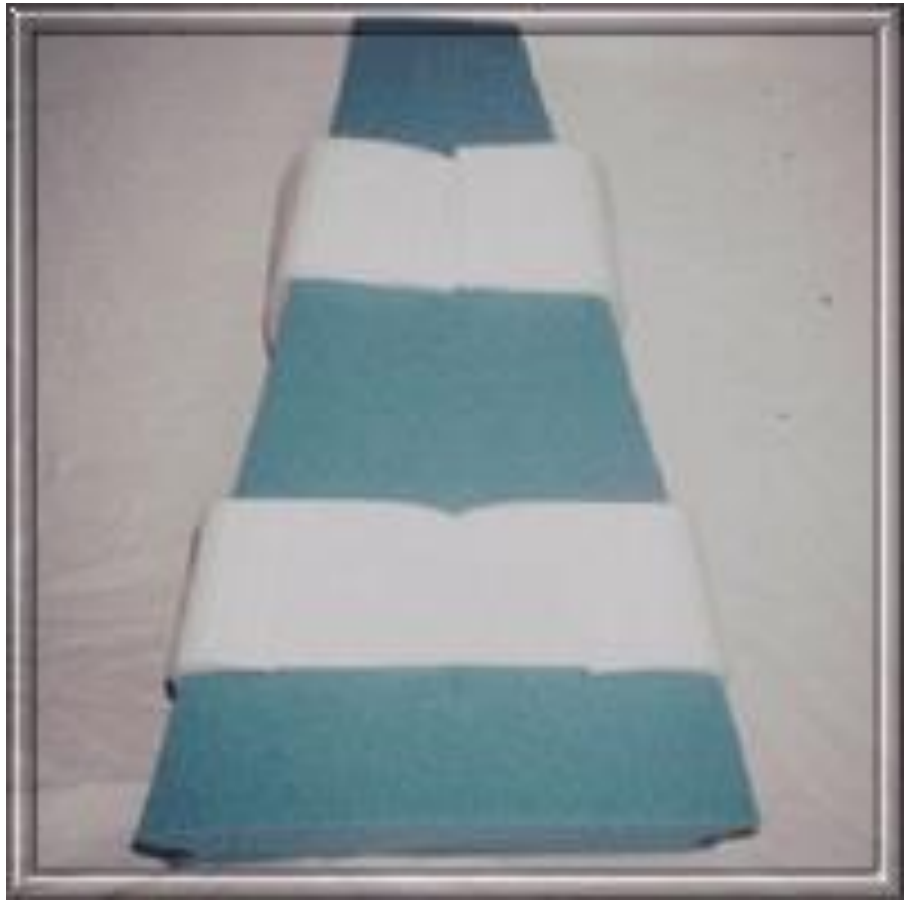
Pemakaian protesa

Modalitas
- Terapi dingin
- Terapi panas
- TENS

Pemulihan psikologis

EXERCISE…EXERCISE…and EXERCISE

ABDUCTION PILLOW

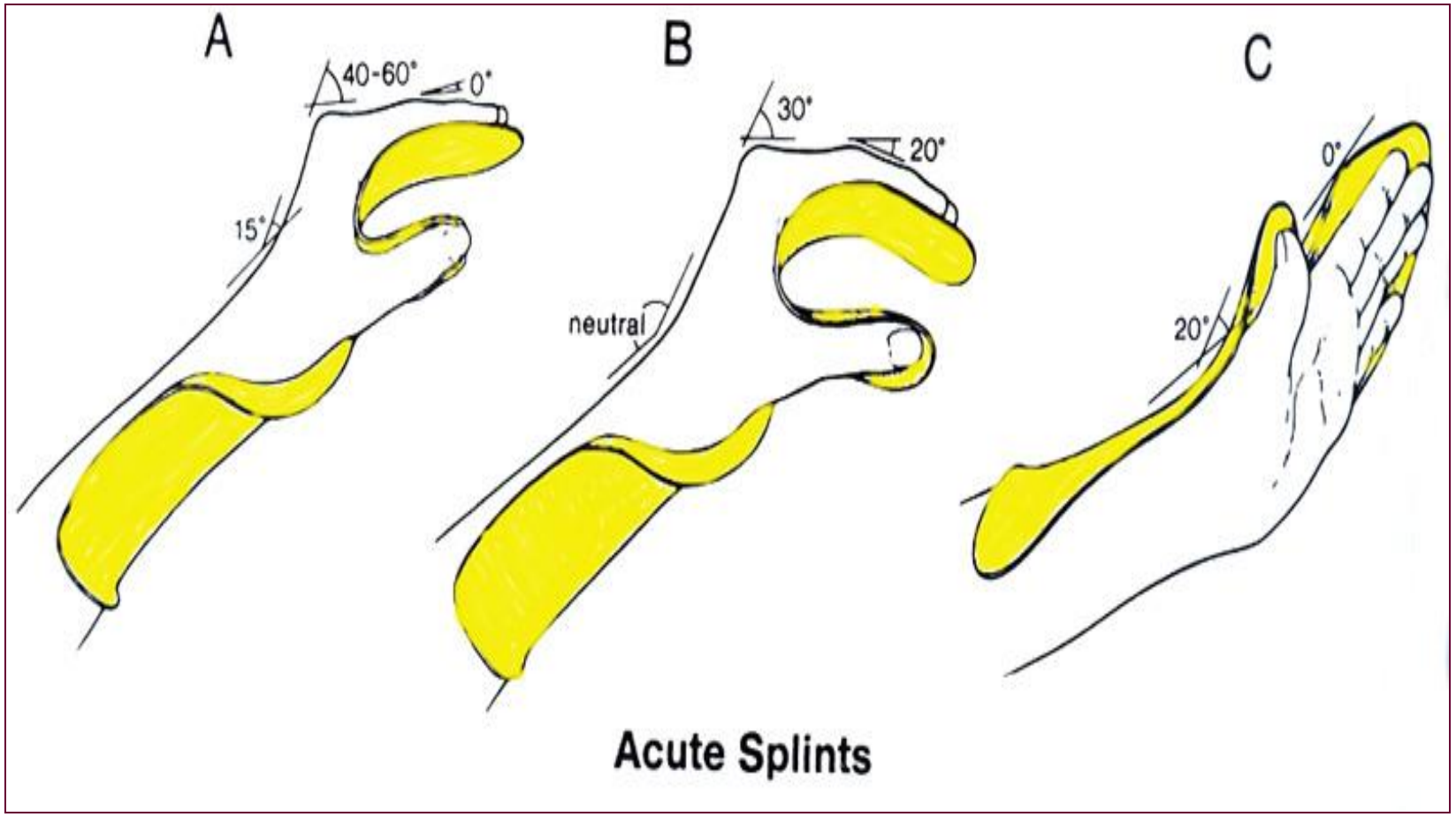


ORTESA

CERVICAL COLLAR

HAND POSITIONING PADA LUKA BAKAR

ACUTE SPLINT



CONVALESCENT SPLINT

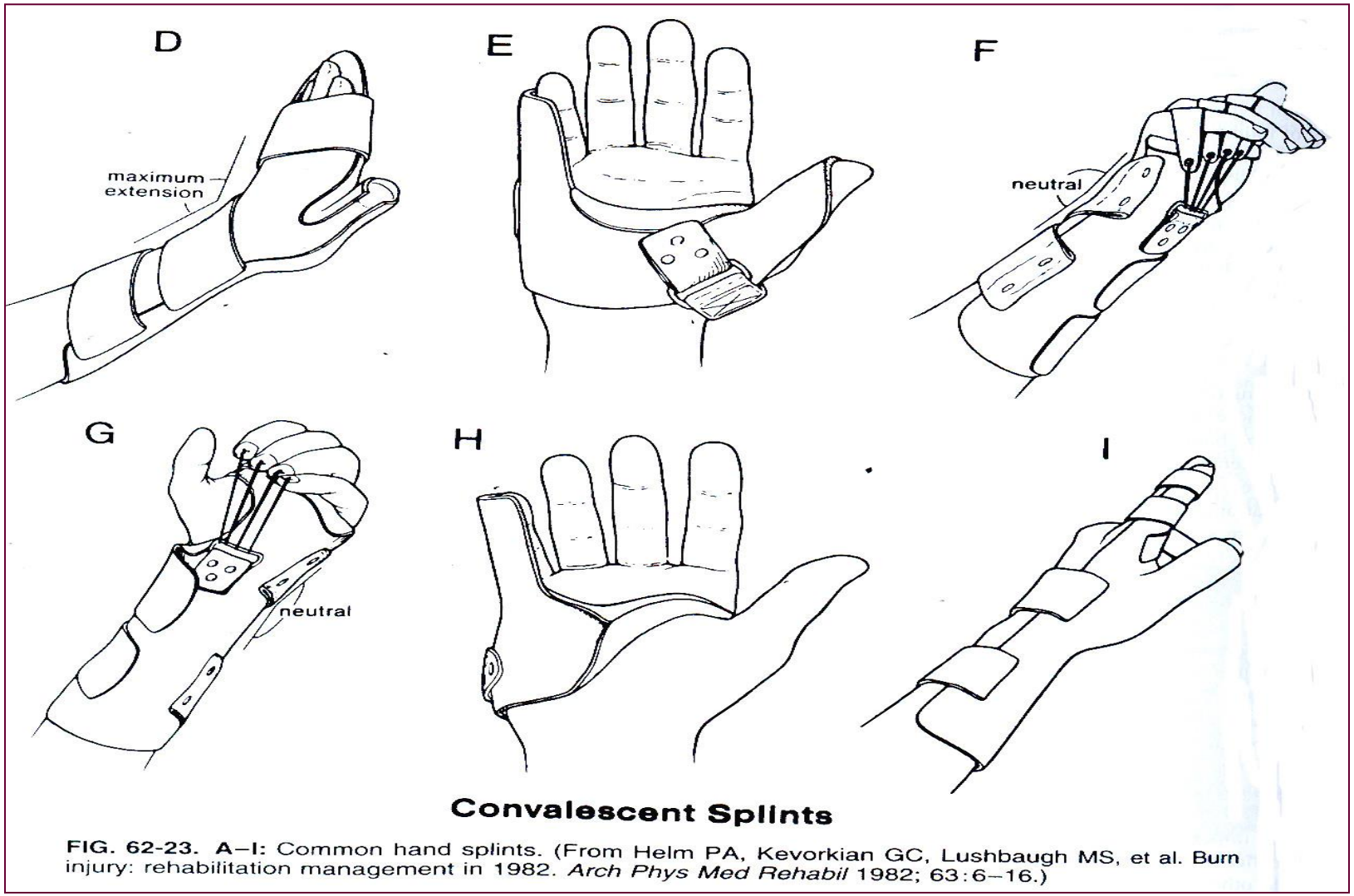


FIG. 62-23. A–I: Common hand splints. (From Helm PA, Kevorkian GC, Lushbaugh MS, et al. Burn injury: rehabilitation management in 1982. *Arch Phys Med Rehabil* 1982; 63:6–16.)

SPLINT

ANTERIOR ELBOW SPLINT

LONG LEG SPLINT

LATIHAN ADL

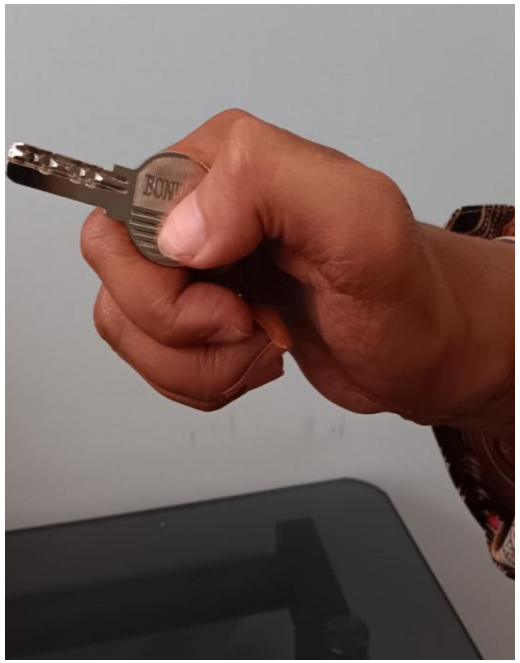
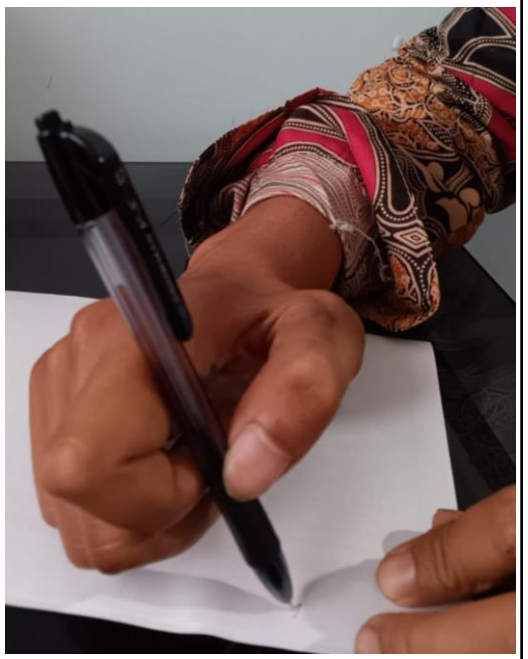
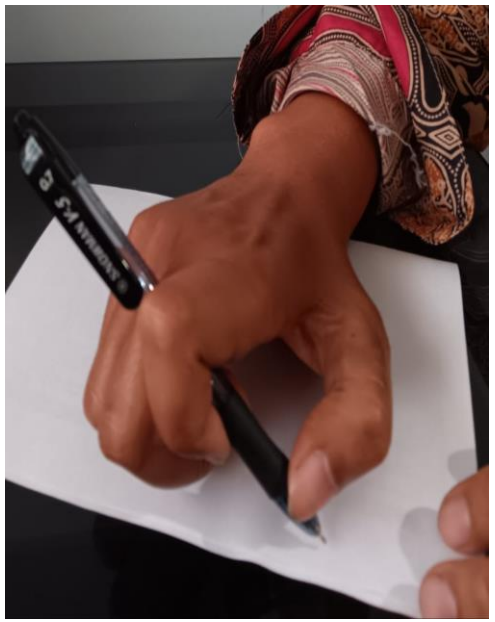
BODY FUNCTION

Hand function

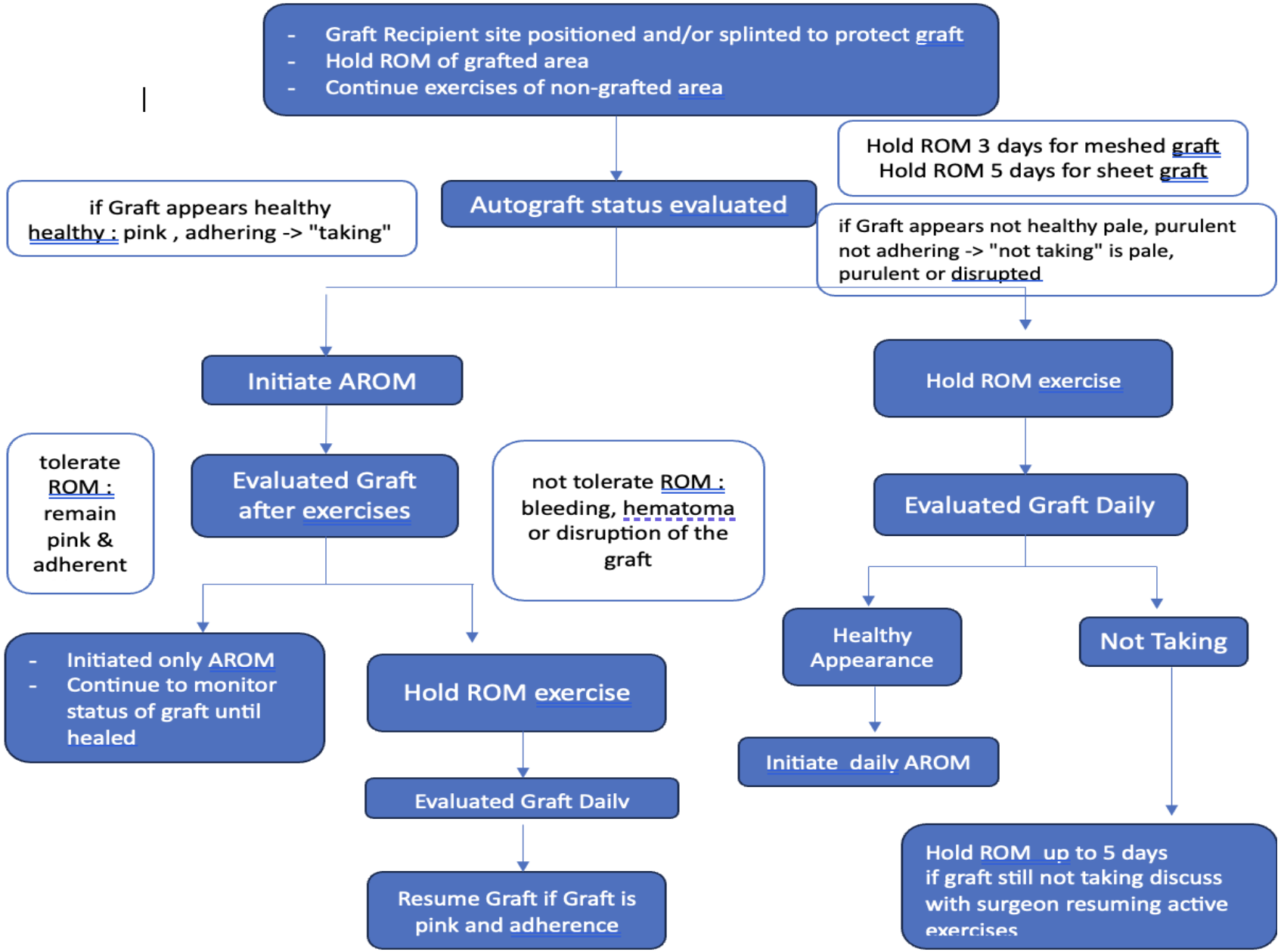
Hand Prehension	Cylindrical grip	Spherical grip	Fist grip	Hook
Kanan/kiri				
	Inadekuat/adekuat	**Inadekuat**/adekuat	**Inadekuat**/adekuat	Adekuat/adekuat

BODY FUNCTION

Hand function

Hand Precision	Lateral pinch	Pad to pad	Three jaw chuck	
				
Kanan/kiri	**Inadekuat**/adekuat	**Inadekuat**/adekuat	**Inadekuat**/adekuat	Modifikasi

GRAFT OVER / NEAR JOINT



GRAFT AT LE


Above the knee
Begin ambulation 24 hours after graft placed
Below the Knee
Meshed Graft
3rd day post-surgery graft is evaluated
Graft is pale, non-adherent or purulent
Hold ambulation re-evaluated each day
Graft is pink & adherent
- Figured of 8 elastic wrap toes to above knee
- ambulate 5 minutes each hour
Graft shows bleeding, hematoma or disruption
Hold ambulation
Re-evaluate each day, resume ambulation once graft appears healthy
If not able to resume after 5-7 days, discuss with surgeon option of
Graft remain, pink, adherent, no disruption
Progress time ambulating in 5-10 minute increments each day as the graft tolerates
Progress to independent gait
Sheet Grafts
5rd day post-surgery graft
Graft is pale, non-adherent or purulent
Hold ambulation
bleeding, hematoma or mechanical disruption
Hold ambulation
Re-evaluate each day,
resume ambulation once healthy : if unable to ambulate after 5-7 days discuss with surgeon
Graft is pink & adherent
- Figured of 8 elastic wrap toes to above knee
- ambulate 5 minutes each hour
Graft tolerates Progress ambulation in 5-10 minute increments each day as the graft tolerates
Progress to independent gait
Plantar surface of the foot
Discuss with surgeon timing of ambulation weight bearing status & foot wear

ACUTE BURN REHAB

Problem	Goal	Treatment
Burn injury extends across joint	Maintain normal range of motion	1. Active and passive range of motion (ROM) exercises 2. Splint involved joints 3. Position joints in anticontracture position
Loss of range of motion	Restore normal ROM	1. Prolonged stretching techniques 2. Active and active assistive ROM exercises 3. Position involved joint in a custom splint 4. Measure and monitor ROM
Loss of elbow, shoulder ROM	Restore motion	1. Classic sites for heterotopic ossification (HO): elbow and hip in children 2. Active exercise in available ROM 3. Begin work-up for HO
Exposed tendon	Prevent tendon destruction Prevent adhesions	1. Prevent desiccation by applying wet dressings 2. Splint in slack position 3. Exercise gently through limited ROM 4. Exercise adjacent joints avoiding stress on exposed tendon
Exposed extensor hood mechanism of hand	Prevent loss of extension mechanism	1. Splint in extension for 6 weeks 2. After 6 weeks begin active exercise
Joint capsule exposed but not open	Avoid drying of tissue	1. Wet dressings; irrigate 2. Gentle exercise through available ROM; splint otherwise
Open joint	Fusion; spontaneous ankylosis	1. Splint to protect wound or amputation inevitable; preserve length 2. Monitor for septic arthritis

ACUTE BURN REHAB

Mobility and activities of daily living (ADLs)		
Gait abnormality; loss of mobility	Restore normal gait	1. Physical therapy for gait training; may require a gait aid 2. Monitor for gait deviations secondary to contracture, weakness, or pain
Impaired ADL skills	Independence in self-care	1. Occupational therapy 2. Assistive devices as needed
Hand burns	Restore normal function	1. Splinting hand in functional position 2. Elevate hand to decrease edema formation 3. Specific hand exercise program 4. Once wounds healed, they benefit from pressure glove
Other rehabilitation concerns		
Compression mononeuropathy	Prevention of nerve injury	1. Proper positioning 2. Avoid pressure over areas where peripheral nerves are superficial, e.g., fibular head 3. Monitor splints for proper fit and application
Inhalation injury Excessive secretions	Restore pulmonary function Prevent pneumonia	1. Percussion and postural drainage 2. Assisted cough techniques

ACUTE BURN REHAB

Problem	Goal	Treatment
Rehabilitation after skin grafts and joint release		
New skin grafts	Protect new graft from unwanted shear or stress	1. Splint until surgically cleared for motion 2. Elevate involved limb above level of heart 3. Avoid dependent position until cleared by the surgeon; 3–5 days typical except for lower extremities (see below) 4. Proper positioning 5. Resume exercise when surgeon clears
Resume ambulation after grafting to lower extremities	Independent gait and transfer	1. Begin weight bearing after cleared by surgeon; typically in 5–7 days 2. Use pressure wraps over newly grafted areas to prevent edema and sloughing 3. Begin with dangling legs in increasing increments of 5–10 minutes and monitor for edema
Release of contracture	Maintain ROM	1. Resume ROM when surgeon permits 2. Splint to maintain ROM 3. Monitor grafts

POST ACUTE BURN REHAB

Problem	Goal	Treatment
Joint contracture	Maintain normal ROM Restore normal ROM	1. Prolonged stretching techniques 2. Active and active assistive ROM exercises 3. Position involved joint in a custom splint 4. Measure and monitor ROM 5. Consider heterotopic ossification when ROM is lost despite appropriate exercise
Generalized weakness	Regain normal strength	1. Consider burn or critical care peripheral neuropathy or myopathy 2. Progressive strengthening; emphasize extension
Poor endurance	Normal cardiopulmonary function	General conditioning program
Scarring in healed partial- and full-thickness burns	Prevent or reduce scarring	1. Once wound is closed, apply pressure of at least 25 mmHg (capillary pressure) 24 hours/day until scars are no longer hyperemic and are soft and pliable (18–24 mo) 2. Custom-fitted garments 3. Elastic bandages 4. Elastic stockinet; molded inserts 5. Acrylic face masks 6. Splints 7. Local steroid injection for specific lesion of limited size

POST ACUTE BURN REHAB

Pruritus	Reduce discomfort Prevent local trauma from scratching	1. Moisturize skin 2. Massage 3. Oral or topical diphenhydramine HCl 4. Oral hydroxyzine HCl 5. Wearing of pressure garments 6. Avoid overheating 7. Oatmeal baths; cool showers 8. Limited use of topical steroids or EMLA cream
Gait abnormality, abnormal posture	Normalize mobility and posture	1. Gait training 2. Assistive gait devices 3. Mirrors or other feedback regarding posture or gait 4. Evaluate for specific muscle weakness or contracture
Impaired ADLs	Restore functional independence	Occupation therapy for training and assistive devices
Impaired hand function	Restore fine motor and coordination	1. Occupational therapy (OT) for hand therapy 2. Fit with custom pressure gloves to maintain web spaces and reduce scarring 3. Sensory loss may be seen from inability of nerves to re-grow through scar tissue of loss from full-thickness burns 4. Gloves and protective hand garments 5. Patient education
Intolerance of heat and cold	Maintain normal body temperature	1. Appropriate clothing 2. Educate patient to avoid extreme temperatures

POST ACUTE BURN REHAB

Problem	Goal	Treatment
Skin sensitivity and fragility	Prevent abrasions and local breakdown	1. Moisturizers to prevent dryness 2. Gloves and other protective garments 3. Avoid handling chemicals (e.g., gasoline, strong detergents) 4. Educate patient in skin care and protection
Sun sensitivity	Prevent sunburn	1. Use sun-blocking agents (UVA, UVB); SPF of at least 35 2. Specialized clothing with sun-blocking qualities 3. Hats, gloves
Inhalation injury	Increase pulmonary	1. Initiate pulmonary rehabilitation program 2. Energy conservation techniques


Kontraktur
Termoregulasi
Skar hipertropik
KOMPLIKASI
Neuropati
Ossifikasi heterotopik
Amputasi

TILTING TABLE → LATIHAN MOBILISASI

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TERIMA KASIH