RECONSTRUCTIVE SURGERY IN LEPROSY



Dr.R.Veerakumaran, M.B.B.S, D.Ortho., DNB Ortho HOD Surgical Dvn, CLTRI

LEPROSY-NERVE INVOLMENT

- HIGH ULNAR NERVE PALSY > LOW ULNAR NERVE.
- MEDIAN NERVE WRIST LEVEL Low level
- ISOLATED RADIAL NERVE INV EXTREMELY RARE.
- THE POSTERIOR TIBIAL NERVE ANKLE-Lower level lesion
- COMMON PERONEAL NERVE NECK OF FIBULA-High or low - deep peroneal nerve lesion

OBJECTIVES of RCS

- Provide Improved Function
- Correct Visible Impairment
- Improved Function
- Improved Appearance
- Reduction of Stigma
- Prevention of secondary deformities
- Regaining Self-respect and Hope
- Increased Self-care activities and provide protection

TYPES OF RCS

- Surgical Decompression of Nerves
- Tendon Transfer Surgeries
- Correction of Deformity of Face
- Correction of Bone and Joint Deformities of Hand and Feet
- Management of Plantar Ulcers

ROLE OF SURGERY IN LEPROSY



NERVE INVOLVEMENT - THREE STAGES



Neuritis Treatment

1. Medical

- 1. Rest
- 2. Steroids
- 3. Physiotherapy
- 2. Surgical
 - Decompression
- 3. RCS end stage



SURGICAL DECOMPRESSION

• NERVE ABCESS





Fascicle







Unfavorable outcomes

- Scar adherence
- Discharging sinus
- Paresthesia
- Incomplete decompression
- Ulnar nerve subluxation
- Drop Foot
- Injury to posterior tibial vessels

WHAT ARE THE DISABILITIES CAUSED

PRIMARY DISABILITY	SECONDARY DISABILITY
LOSS OF Sensation	• ULCER
DEFORMITIES	KERATITIS
-LAGOPHTHALMUS	CORNEAL OPACITY
-PARALYSIS :	BLINDNESS
1. CLAW	CRACKS, FISSURES
2. DROP FOOT	STIFFNESS
3. CLAW TOES	CONTRACTURES OF DIGITS
	ABSORPTION AND LOSS OF
	FINGERS
	LOSS OF TOES

CRITERIA FOR REFERRAL OF CASES

- Physical
 - Age
 - Duration of Paralysis
 - Status of Skin and Joint
- Disease
 - MDT Status
 - Reaction and Steroids
- Social -Patient motivation
 PRIORITIES
- Correction of Eye Deformity
- Correction of Foot Deformity
- Correction of Hand Deformity

TENDON TRANSFER PRINCIPLES

- Soft tissue equilibrium- Nonprogressive disease
- Joint supple
- Correction of contracture
- Arthrodesis before transfer
- Expendable donor availability
 - Power of Donor tendon
 - Amplitude
- Agonist preferred over Antagonist and One tendon one function
- Straight line of pull as possible
 - -Transfer subcutaneously along fascial planes
 - Pulley to be used
- Sensation intact
- Minimal dissection

DEFORMITIES OF FACE

- Lagophthalmos
- Loss of eyebrows
- Saddle Nose
- Ears

Treatment of Lagophthalmos

Static procedures

- Tarssoraphies
 - Mclaughlin Lateral Tarssoraphy
 - Fritschi's Medial Tarssoraphy
- Canthoplasties

Dynamic procedures

- Muscle transfers
 - Temporalis transfer
 - Gillie's Method
 - Johnson'sMethod
 - Masseter transfer



LAGOPTHALMOS-Aims

- Narrowing of the widened palpebral fissure
- Correction of ectropion
- Voluntary closing and opening of eyes
- Opposition of lower eyelid and Lac. punctum













Unfavorable outcomes

- Too loose
- Too tight
- Injury to lacrimal sac
- Post op Ectropion
- Muscle bulk at anastomosis site

DEFORMITIES OF FOOT

- Drop Foot
- Clawed toes
- Neuropathic ankle
- Plantar ulcers
- Contractures

DROP FOOT SURGERY CIRCUMTIBIAL ROUTE









COMPLICATIONS OF DROP FOOT SURGERY

- Lack of dorsiflexion
- Residual inversion/eversion
- Lack of range of movements
 - Adhesions
 - Poor patient motivation
 - Decrease in muscle power
- Poor gait
- Secondary claw toes
- Hind foot instability
- Reversal of metatarsal arch

Claw Toes











DEFORMITIES OF HAND

- Ulnar nerve palsy Claw hand deformity
- Median nerve Ape thumb deformity
- Combined ulnar with median nerve- Z deformity of thumb with claw hand
- Radial nerve palsy Wrist Drop
- Swann neck deformity
- Boutonniere deformity
- MCP, PIP, DIP contracture
- Guttering deformity
- First web space wasting
- Mitten hand

Ulnar nerve palsy

Primary Impairment

- Loss of protective sensation
- Clawing
- Reversed finger closing pattern
- Loss of finger Abd. & Add
- Loss of metacarpal arch
- Decreased pinch strength

Secondary impairments

- Ulcers/scars/absorption
- Contractures
- Long finger flexor tightness- Bouvier's test
- Contracture oblique
 retinacular ligament
- Hooding deformity-Elson's test
- Habitual Wrist flexion
- Z-Thumb

PRINCIPLES OF SURGERIES IN CLAW HAND



 REDISTRIBUTION OF FORCES AROUND M.C.P. JOINT OF FINGER



FLEXOR PULLEY INSERTION SURGERY

Direct -ZANCOLLI'S LASSO procedure

-Using FDS (Long/Ring finger)

Indirect- ZANCOLLI'S LASSO procedure

-Palmaris Longus, ECRL

- A tensor fascia Lata (TFL) Tendon graft used to increase the length to the flexor pulley in Indirect LASSO
- PL or ECRL LASSO preferred for patient with hyper mobile joints or long fingers.
- In hands with reversed distal transverse meta carpal arch – 5th slips created to insert in ulnar side of ADM to increase arch.

Lateral band insertion surgery



STATIC PROCEDURES

- 1. ZANCOLLI'S M.C.P. CAPSULOPLASTY
- 2. Bunnel-Palande PULLEY ADVANCEMENT
- 3. DERMADESIS
- 4. Parke's graft tenodesis
- 5. Srinivasan extensor diversion graft

A release of A1 pulley and advancement of proximal edge of A2 pulley – allowed bow syringing of flexor tendon to create flexion of MCP joint

For patient with minimal claw – small unassisted and noassisted angle

Factors

- Presence of secondary impairments
- Strength of long flexors
- Strength of donor tendon
- Hyper mobility of the joints of digits
- Presence of Palmaris longus tendon
- Unassisted, assisted and contracture angle
- Heavy or light work
- Dominant or non-dominant hand







Hyper mobility of joints

- Passively extending the joint DPX goes beyond vertical axes of PPX
- Swan Neck Deformity





Resting / Unassisted Angle



Angle of PIP joint, asking the patient to keep the hand in normal anatomical position





-Angle of PIP joint, by keeping the MCP joint flexed by an asst
-Decrease in function of DDE

Angle of PIP joint by passively extending the PIP joint



Direct LASSO procedure using FDS

- Suitable:
 - Mobile claw hand with 0 10 assisted angles
 - Hooding deformity of ring finger
 - Gross two finger claw
 - Both heavy or light workers
- Not suitable:
 - Assisted angles present (leads to residual PIP flexion after surgery)
 - Hyper mobile PIP joint of donor digit (likely to result in an INTRINSIC PLUS deformity)
 - Weakness of FDS/FDP of donor digits.

Indirect LASSO (PL/ECRL)

- Suitable:
 - Hyper mobile PIP joint of donor digit (No alteration in balance of forces of digit)
 - In balance of FDS/FDP (these are not compromised as result of surgery)
 - Preferably light workers
- Not suitable:
 - PL weakness/absent
 - Patient of inadequate capabilities of compression

Direct LASSO (middle FDS)









Sublimus 4 Tail

- Suitable:
 - Presence of assisted angle
 - Stiff hand, contracture
 - Long term physiotherapy for release of contracture
 - Both light or heavy workers
- Not suitable:
 - FDS/FDP weakness
 - Hyper mobile PIP joint of long finger





EF4T with <u>ECRL</u>, EMT with <u>ECRB</u>, <u>PL</u> 4T

- Suitable:
 - Mobile hands with or without assisted angle
 - Preferably light workers
- Non suitable:
 - Patient inadequate capabilities of comprehension
 - Donor tendon weakness
- Issues:
 - Graft and anastomosis
 - Patient re-education







EMT with <u>ECRB</u>

Pulley advancement / Capsulorraphy

- Suitable:
 - Minimal claw i.e. small unassisted angles and no assisted angles
 - CAPSULORRAPHY in slightly higher unassisted angles (has to be combined with Pulley Advancement surgery for reasons of access)
 - Patient not suitable for more complicated procedures
- Not suitable:
 - Not done if existing assisted angle
 - MCP joints flexed at Capsulorraphy site giving an unnatural appearance (inability to extend MCP fully)









Various tendon transfer options

	Mobile	Hyper mobile	Stiff hand
1. Direct LASSO	V	Х	Х
2. Indirect LASSO	\checkmark	\checkmark	Х
3. 1 in 5 LASSO D/ID	V	-	Х
4.ACPA	\checkmark	\checkmark	\checkmark
5. PL 4 tail	±	±	Х
6. EF 4 tail	±	±	\checkmark
7. E to E 4 tail	±	±	V
8. Sublimus 4 tail	Х	Х	V

	Assisted angle 0	Assisted angle +	Minimal unassisted
1. Direct LASSO	V	Х	±
2. Indirect LASSO	V	Х	±
3.1 in 5 LASSO D/ID	V	Х	±
4.ACPA	V	Х	V
5. PL 4 tail	±	Х	±
6. EF 4 tail	±	V	±
7. E to E 4 tail	±	V	±
8. Sublimus 4 tail	±	V	Х

	PL Weak or Absent	2 finger Claw	Long flexor weakness
1. Direct LASSO	-	V	Х
2. Indirect LASSO	√ - Using ECRL	-	Х
3. 1 in 5 LASSO D/ID	-	-	-
4.ACPA	-	V	Х
5. PL 4 tail	Х	-	V
6. EF 4 tail	-	-	\checkmark
7. E to E 4 tail	-	-	V
8. Sublimus 4 tail	-	-	Х

COMPLICATIONS IN ULNAR PALSY

- Swan neck deformity
- Superficialis minus deformity
- Check-rein deformity
- MCP joint contracture
- Inability to completely close the fist
- Distal transverse metacarpal arch
- Median nerve injury
- Deviation of fingers

Median nerve palsy







- **Ape thumb deformity**
- 1st web space contracture
- Z thumb



Median nerve palsy

- Using FDS Suitable:
 - Stiff hand
 - Inadequate IP extension of thumb
 - Dominant hand
 - Heavy workers Not suitable:
 - FDS/FDP weakness of donor digit
- Using EIP/PL- Suitable:
 - Good IP extension of thumb
 - Mobile deformity
 - Hyper mobile PIP joint of ring finger
 - Not suitable:
 - Patient of inadequate capabilities of comprehension
 - Radial nerve palsy/EIP weakness

FDS OPPONENS PLASTY





EIP TRANSFER











Advantages

- If freed from surroundings of tissue no –angulation
- FDS spared for any claw correction
- No pulley requirement

Disadvantages:

- Loss of independent index MCP joint extension
- Extension lag at the MCP joint
- Adhesions in the path of transfer
- Reaches site of insertion with very little left over tendon

THUMB WEB CONTRACTURE RELEASE







Mild -Thumb web splint Moderate - simple Z plasty -First web plasty Severe -Dorsal rotationflap (Mittenhand)

Z THUMB

Procedures

- Half FPL transfer to EPL
- Additional Lasso slip to AP
- Arthrodesis- MCP/IP joint





RADIAL NERVE PALSY- JONES TRANSFER WRIST _____PR.TERES to ECRB EXTENSION (OR) WRIST FUSION

FINGER \rightarrow F.C.R. / F.C.U. \rightarrow EXT.DIG. EXTENSION

 $\begin{array}{ccc} \mathsf{THUMB} & \longrightarrow & \mathsf{PALMARIS} & \longrightarrow & \mathsf{FPL} \\ \mathsf{EXTENSION} & & \mathsf{LONGUS} \end{array}$

TRIPLE NERVE PALSY

- Two stage procedure
- 1st stage
- Restoration of extension of wrist and fingers
- 2nd stage
- Restoration of lumbrical action by long FDS thumb opponens plasty by ring FDS
- Tenodesis of radial FDP with ulnar FDP tendon
- Wrist arthrodesis
- Hinge hand EDC attached to extensor retinaculum FDS attached to deep fascia in fore arm
- Finger IP arthrodesis

Swan neck deformities

- Littler's excision of Dorsal expansion
- Lateral band incision in the proximal third
- Fritschi's longitudinal incision along expansion
- Tenodesis of FDS
- Contracture release and reconstruction with flap
- Arthrodesis
- Dermadesis







Finger Contractures

Causes

- Reaction hand
- Oblique retinacular ligament contracture
- Removal of FDS

Treatment

- PIP Joint
- MCP joint
- DIP joint

- -V-Y plasty -Arthrodesis
- -Dorsal contracture release
- Arthrodesis





Correction of First web space wasting





Gynecomastia

• Webster's surgery





Smile Is Contagious , Leprosy Is Not

THANK YOU

