ACL Injuries (Post reconstruction / Conservative)

Name: Age/Sex:

Occupation:

OPD No:

Address:

1. **Patients brief Summary:**
    a. Chief complaints
    b. Mechanism of injury (If conservative)
    c. Previous Injuries (relevant)
    d. Surgical History (associated ligament & meniscal injuries / type of graft)
    e. Comorbidities
    f. Activity level before injury & objectives if any
    g. Emphasis on (pain, mobility, instability, swelling (occurrence))
    h. Presentation of problems at activity / sports (pre, during, post)
2. **Observation**
    a. General – (whole body appearance)
    b. Local –Swelling, Colour (Surgical Incision – if applicable)
    c. Position of limb comfort – if relevant*
    d. Posture
3. **Examination**
    a. Pain
    b. FLAGs – trauma to bones and other ligament
    c. Limb Oedema
    d. Joint effusion (grading)
    e. Special test (only if indicated , NOT done in reconstruction and immediately after injury)
    f. AJROM (observe the Quantity, Movement pattern, Muscle activity (inhibition / number of muscle fibres recruited), kinematics, protective mechanism
        i. Knee (Flex and Extension)
        ii. Ankle (DF/PF /Eversion) – Precaution in Peroneal graft (avoid In/Ev)
        iii. Hip (SLR/Abd/extension/ Add)

g. PJROM (Knee – TF/PF) - (with special precautions as per guidelines)
    i. End feel
    ii. List the structures limiting the movements
    iii. Observe for tibia rotation during extension and flexion
    iv. Ankle (DF/PF /Eversion) – Precaution in Peroneal graft (avoid In/Ev)
    v. Hip (SLR/Abd /extension/ Add)
h. Strength (Quadriceps / VMO/ Hamstrings / Hip Abductors)
    i. Isometric strength testing (Muscle activity (inhibition / number of muscle fibres recruited)*
    ii. MMT / 1or 10 RM after 3 weeks (once stability of joint is achieved)
    iii. Dynamometer (OPD, after 2 weeks)
    iv. Functional- combined (CKC) – (After 2 weeks)
i. PSFS (patient specific functional scale)
j. Balance (Relate with the possible factors (proprioception / strength / control)
k. Functional Movement analysis (relate with normal pattern, identify the possible structure)
l. Core muscle strength (upper body and spine)
m. Gait Analysis
    i. Function / Gait status – Level of independence.

4. **Joint support status during mobility** – (Not supported / on Brace / on Dynamic brace (mention range))

ICF- (OPD)

ICF domain	Assessment summary	Measurement used
Body structure	- Structure (Lower limb & Upper limb) related to movement - Musculoskeletal structure related to movement. (Swelling /effusion /scar/ Muscle wasting/ Hip&Knee / Bony alignments)	

Body function	- Sensation of pain - Mobility of Knee joint - Stability of knee - Muscle power - Motor control / proprioception - Muscle endurance - Gait pattern	
Activity & Participation	- Walking - Moving around - Driving - Sports activity - Community Life - Activities at work - Recreation and leisure	
Environment	- Products and technology for personal use in daily living - Construction and building and technology of buildings for public use	

5. Summary of findings.

6. Functional Diagnosis / Areas of concern

Clinical Reasoning

	Clinical relevance / contributing factors / Hypothesis / Reasoning	**Important information**
Age	Healing / strength / mobility / degenerative / activity / sports participation	
Chief Complaints	List the reported symptoms (Pain, Mobility, instability)	- Relate with injury /surgery/procedure - Identify Flags
Surgical history and comorbidities	Surgical History – Incision / type of graft , associated injuries & repair Relevant medical conditions	Past relevant injuries Previous Functional status

	Relevant Past history (Body Function status / sports participation/contributing factors that may influence the exercise planning)	Assisted devices used for supports, transfers and mobility
Observation	General – (whole body appearance)	BMI To understand obesity / overweight contributing to exercise planning
	Local – Surgical Incision, Swelling, Colour	Healing (stages- inflammatory/ remodelling etc.,) Scar (grading)
	Position of comfort adaptation* Posture	knee FFD / Valgus / Varus / Tibia position / Patella position Posture (Sagittal and frontal)
Examination	Pain (identity FLAGs, relate to surgical history, tissue healing, medication)	Type , Intensity , duration and frequency, during movement
	AJROM **Knee** (Flex and Extension – Short arc / High sitting (only perform if good control over joint during movement) **Ankle**(DF/PF/INV/EV)	Movement pattern, quantity, muscle activity, kinematics, protective mechanism) Active SLR – (to measure knee functional lag) Identify - Lag - Muscle inhibition - Muscle power Note :Immediately after surgery , most of the clients may not be able to perform movements at knee due to pain / inhibition / surgical incision (as it requires to generate a greater amount of torque to produce movements)

	PJROM (in all plane) (Knee , Hip and Ankle) - (with special precautions as per guidelines) - End feel - List the structures limiting the movements	Quantity, end feel (avoid Hyper extension / excessive anterior translation of tibia during extension)
	Strength Knee – (isometric strength testing) – Progress to Dynamometer and 1RM (closed kinematic chain) at the later stage when indicated.	Knee - Quadriceps Hamstrings Hip muscles (checked with knee locked in brace at 0 degrees) Ankle muscles
	PSFS (patient specific functional scale) -	With reference to activities as reported by client Identify the functional limitation
	Balance Relate with the possible factors (proprioception / strength / instability)	standing / perturbation
	Functional Movement analysis (relate with normal pattern, identify the possible structure)	- Sit to stand - Squat (mini) - Walking - Stair climbing - Stepping (normal / over obstacles) - Running - Jumping - Side translations
	Gait Analysis (OPD)	Kinematic / Temporal / spatial parameters
	Movement analysis	Sit to stand / Squatting / jumping (if applicable) Kicking
	Function / Gait status – Level of independence	Total assist/ max/mod/min assist / Independent Movement pattern at

		knee (available flexion) Distance walked (observe for discomfort during function and gait)

*emphasis during admission as In-patients

PT Plan of care

Pre- op / Prehabilitation

Mode	Reasoning
Exercise counselling	Gain confidence
Upper limb exercise	Assistance in mobility / crutches
Upper body and core muscle strength	Contributes to knee stability and vice versa
Stretching exercises	Hip Flexors/ iliopsoas (Avoid in case of Hip fractures posted for THR) hamstrings / calf
Exercises to Hip / Knee and ankle	Activation and training for Quads/ hams/ Hip Abd / Extensors / Calf muscles (aid in re-education during inhibition after surgery)
Functional education and training	
Sports specific training (education)	

Post op

Week 1-2	***Goals***
- Brace continued, Weight as tolerated – wean from crutches if good mechanics is observed - JROM – 0-75 - SLR achieved - VMO recruitment – emphasis on full active extension - ST mobilization to Patella / patella tendon / posterior /patella mobilization structure. - Cryotherapy	-Achieve full weight bearing - Achieve PROM (0-90) - Decrease swelling /pain /inflammation - Patella mobility
Weeks 2-4	**Criteria full extension /flexion 90**
- Wall slides (ST/ Peroneal graft) - Heel slides (PTBG)	- Proprioception - Complete passive

- JROM exercises (0-110) - Functional CKC exercises - Mini squats / modified lunges (avoid varus /valgus stress) - Leg press - Calf muscle exercises - Proprioception exercises - Stationary bike - Upper body conditioning exercises * *If hamstring graft,* no active hamstring exercises until 2 weeks and no open-chain resisted hamstring curls until 4 weeks post-op *If patella tendon graft,* no resisted leg extension machine at any point.	knee extension - Increase strength of Hams and Quads - Controlled ambulation (4-10weeks) - Static – dynamic - Balance exercises - OKC (6 weeks)
Weeks 6-8	
+ lateral training (side walking)	
Weeks 8-10	
- 30-80 degrees of knee flexion strengthening exercise	
Weeks 10-12	***Criteria - Normal gait / full knee extension & flex 130***
Weeks 12-14 • Patients can begin jogging at 14 weeks assuming they have adequate quadriceps control and no complications. Their first few sessions of running should be monitored by the clinician for proper mechanics. • At 14 weeks, the patient will have a follow-up appointment and a functional test. The functional test consists of: • Ground clock / timed • Unilateral squat / timed / to 70 degrees of flexion • Lateral shuffle / leaping • Two-legged leap / distance • Jogging • Unilateral balance • Other functional test specific to patient's activity	Achieve optimal strength N-M control JROM – Full Resistance training Plyometric Dynamic stability Jogging (>13 weeks)
Phase 4 (week 16 -22)	Increase strength of muscles/balance / proprioception to

	optimal Functional and Sports specific exercises

Functional evaluation is performed at 14 weeks, 6 months, and 1 year post-operatively to objectively assess what specific strength and weakness exist.

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION MENISCUS REPAIR

General Considerations:

- It is important to recognize that all times are approximate and that progression should be based on careful monitoring of the patient's functional status.
- PROM as tolerated. Early emphasis is on achieving full extension.
- Patients will be in a knee immobilizer for 4 weeks post-op.
- Non-weight bearing for 3-4 weeks
- Closed chain activities initiate at 3-5 weeks post-op and beginning between 20°-70° OR in full extension to avoid stress onto the repair. Avoid sub maximal CKC exercises for 8 weeks.
- Active hamstring exercises can be initiated at 6 weeks and resistive at 8 weeks.
- No lateral exercises for 10 weeks and no pivoting or ballistic activities for at least 4 months postop.
- No resisted leg extension machines (isotonic or isokinetic) at any point in the rehab process
- Patients are given functional assessment test at 14 weeks, 6 months and 1 year postop.
- Program modified based on whether the meniscal injury is simple or complex.

Week 1:
• Straight leg raise exercises (lying, seated, and standing), quadriceps /adduction /gluteal sets, gait training. • Well-leg stationary cycling, abdominal exercises and upper body conditioning • Soft tissue treatments to posterior musculature, retro patella and surgical incisions
Weeks 2 – 4:

- Continue with pain control, gait training, and soft tissue treatments.
- Aerobic exercises consisting of UBE, well-leg stationary cycling, and upper body weight training

Weeks 4 – 6:

- Discontinue use of knee immobilizer if able to demonstrate adequate quad control
- Incorporate closed-chain exercises (i.e. mini-squats, modified lunges, short step-ups) between 20°-70° OR in full extension. Avoiding going into the last 15°-20° of extension avoids stress onto the repair.
- Add hamstring curls without resistance*.
- Patients should have full extension and 110 degrees of flexion by the end of this period

Weeks 6 – 8

- Leg weight machines (i.e. light leg press, calf raises, abduction /adduction).
- Stationary cycling initially for ROM, increasing as tolerated.
- Increase the intensity of functional exercises (i.e. add a stretch cord for resistance; add weight, increasing resistance of aerobic machines).

Weeks 8 – 12:

- Introduce resistive hamstring curls*.
- Add lateral training exercises (i.e. lateral stepping, lateral step-ups, step overs

Weeks 12-16

- Progress to running as able to demonstrate good mechanics and appropriate strength.
- Begin to incorporate sport-specific training (i.e. volleyball bumping, light soccer kicks and ball skills on contralateral side).
- Patients should be weaned into a home program with emphasis on their particular activity

Weeks 16-24

- Incorporate bilateral jumping and bounding exercises, making sure to watch for compensatory patterns and any signs of increased load onto the knee with take-offs or landings.
- *cautiously introduce hamstring resisted exercises, watching for signs of joint line/meniscus irritation

Home exercise program (HEP)	HEP written based on patient goals with special precautions
Precautions	- Watch incision for signs of separation and/or infection. - Protection of the Joint during (OKC) movements and WBAT - AVOID - beyond patient limits during exercises - Precautions during multidirectional movements and dynamic balance exercise training - Avoid high impact and rapid force exercise
Progression criteria	- Improvements in ROM, muscle function, gait, joint stability and control incrementally according to the protocol. - IF NOT achieved will stay in the previous phase in spite of days - Start plyometric ONLY if good control of joint, normal muscle power as non-affected side, JROM achieved as normal.