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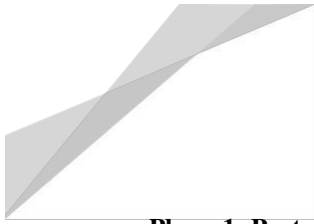
Distal Triceps Repair

Background Information:

The included guideline is intended for post-operative rehabilitation following a distal triceps repair, which is indicated for those with a partial or complete triceps tendon rupture. Progression through this guideline is time dependent on soft tissue healing as well as criterion-based concerning patient demographics and clinical assessment. Rehabilitation for distal triceps repair should be slow following the first six post-operative weeks and should follow biological tissue healing principles for a tendon taking into account inflammatory, proliferative and remodeling phases of healing. Please refer to the surgical note for information regarding each procedure.

Precautions:

- No aggressive triceps stretching following early controlled range of motion guidelines
- All splint and brace use should be given by surgeon. Typical splint use should be for 2 weeks followed by a brace set at range of motion restrictions for elbow flexion (see remaining portion of guideline)
- Limit passive shoulder flexion range of motion to less than 90 degrees for 6 weeks
- No isolated triceps contraction with elbow extension or shoulder extension for 6 weeks
- No resisted or isotonic triceps contraction or shoulder extension/rows for 12 weeks
- No weight bearing or upper extremity closed kinetic chain exercise through the surgical extremity for 12 weeks
 - No pushing open a door or pushing up from a chair



Phase 1: Protection PROM (0-2 weeks)

GOALS:

- Protect the repair
- Minimal to no edema
- Minimize the effects of immobilization

PRECAUTIONS:

- No aggressive triceps stretching/elbow flexion for 6 weeks
- Once out of splint/cast follow brace restrictions for elbow flexion
- Limit passive shoulder flexion range of motion to less than 90 degrees for 6 weeks
- **NO Elbow AROM**
- No isolated triceps contraction with elbow extension or shoulder extension for 6 weeks
- No soft tissue mobilization/cross friction massage directly over scar for 6 weeks
- No resisted or isotonic triceps contraction or shoulder extension/rows for 12 weeks
- No weight bearing or upper extremity closed kinetic chain exercise through the surgical extremity for 12 weeks
 - No pushing open a door or pushing up from a chair

Post-Operative 0 to 2 weeks

ROM

PROM

- Limit shoulder forward elevation to < 90 degrees
- Early controlled motion once in brace:
 - PROM elbow flex locked in 20 degrees
 - Elbow Flexion can progress 15 degrees every 5 days (3 sets of 30 minutes per day)
- NO Active Elbow Extension

Scapular Control Exercises

- Sidelying scapular clocks
 - Avoid shoulder extension contraction

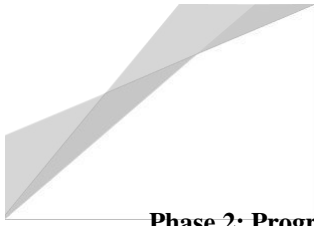
Home Program: educate brace use, precautions, home program for wrist and hand (see below)

*Active Range of motion of wrist/hand (gripping, wrist flex/ext, supination/pronation)
(avoid triceps contraction)*

Modalities/cryotherapy PRN

MILESTONES TO PROGRESS TO PHASE 2:

1. Appropriate healing of surgical repair by adhering to precautions & immobilization guidelines
2. Early controlled ROM in brace performed with emphasis on home program
3. Minimal to no pain (0-2/10) with ROM with NO forced PROM



Phase 2: Progression of Early Controlled Motion (2-6 weeks)

GOALS:

- Protect the repair
- Minimal to no edema
- Progression of early controlled motion within precautions

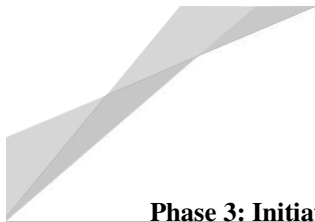
PRECAUTIONS:

- No aggressive triceps stretching/elbow flexion for 6 weeks
- Early controlled motion through therapist guidance and brace use
- Limit passive shoulder flexion range of motion to less than 90 degrees for 6 weeks
- No isolated triceps contraction with elbow extension or shoulder extension for 6 weeks
- No soft tissue mobilization/cross friction massage directly over scar for 6 weeks
- No resisted or isotonic triceps contraction or shoulder extension/rows for 12 weeks
- No weight bearing or upper extremity closed kinetic chain exercise through the surgical extremity for 12 weeks
 - No pushing open a door or pushing up from a chair

Weeks 2 to 4	Weeks 4-6
PROM <ul style="list-style-type: none"> ▪ Limit shoulder forward elevation/Flex to < 90 degrees ▪ Do NOT push elbow flexion AAROM <ul style="list-style-type: none"> ▪ Shoulder & Elbow- Therapist assisted and self-assisted techniques with uninvolved extremity <ul style="list-style-type: none"> -Do NOT push elbow flexion -Avoid elbow ext activation Manual <ul style="list-style-type: none"> ▪ Gentle STM; NOT on surgical scar ▪ Effleurage to improve blood flow & reduce edema <p><i>Active Range of motion of wrist/hand (gripping, wrist flex/ext, supination/pronation) (avoid triceps contraction)</i></p> <p>Modalities</p> <ul style="list-style-type: none"> ▪ Edema control with vasopneumatic compression, cryotherapy, electrical stimulation PRN for pain control 	PROM <ul style="list-style-type: none"> ▪ Continue with shoulder and elbow early controlled motion ▪ Do not push elbow flexion until 6 weeks AAROM/AROM <ul style="list-style-type: none"> ▪ Continue assisted techniques avoiding elbow extension activation ▪ Shoulder AAROM to AROM <ul style="list-style-type: none"> -Self passive/assisted motion with uninvolved extremity -Pulleys -Wand <p>Strengthening</p> <ul style="list-style-type: none"> ▪ NO triceps/elbow ext activation ▪ Submaximal shoulder ISOM <ul style="list-style-type: none"> -Initiate at 25-50% effort & pain-free -AVOID shoulder extension/row <p>Modalities</p> <ul style="list-style-type: none"> ▪ Edema control with vasopneumatic compression, cryotherapy, electrical stimulation PRN for pain control

MILESTONES TO PROGRESS TO PHASE 3:

1. Pain-free full shoulder AROM with good scapulohumeral rhythm
2. Pain-free full elbow flexion PROM (do NOT PUSH ROM)
3. Minimal to no edema



Phase 3: Initiation of Elbow Activation (6-12 weeks)

GOALS:

- Progressive controlled extension activation following tissue healing principles
- Improve shoulder and scapulothoracic strength

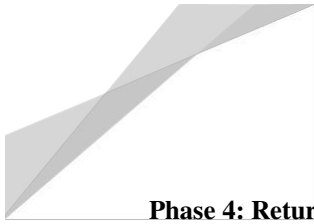
PRECAUTIONS:

- Progressive loading program should be incorporated, avoid unnecessary early activation
- No resisted or isotonic triceps contraction or shoulder extension/rows for 12 weeks
- No weight bearing or upper extremity closed kinetic chain exercise through the surgical extremity for 12 weeks
 - No pushing open a door or pushing up from a chair

Weeks 6 to 8	Weeks 8-12
<p><i>Elbow Brace is Removed (per surgeon guidelines)</i></p> <p>AROM</p> <ul style="list-style-type: none"> ▪ Continue shoulder AROM with emphasis on scapulohumeral rhythm ▪ Initiate elbow extension AROM <ul style="list-style-type: none"> -Concentric motion with NO resistance -NO eccentric triceps activity (use uninvolved extremity during eccentric motion) <p>Strengthening</p> <ul style="list-style-type: none"> ▪ Isotonic shoulder IR & ER with light resistance (scapular neutral plane) ▪ Supine scapular serratus punch/protraction <ul style="list-style-type: none"> -High repetition & low resistance <p>Manual</p> <ul style="list-style-type: none"> ▪ Gentle STM/light scar mobilization if hypomobile <p>Neuromuscular Reeducation:</p> <ul style="list-style-type: none"> ▪ Supine ABCs <p>Modalities</p> <ul style="list-style-type: none"> ▪ Edema control with vasopneumatic compression, cryotherapy, electrical stimulation PRN for pain control 	<p>PROM/AAROM/AROM</p> <ul style="list-style-type: none"> ▪ End ROM mobility per deficits present <p>Strengthening</p> <ul style="list-style-type: none"> ▪ Resisted shoulder ER & IR <ul style="list-style-type: none"> -Continue up to 30 degrees abd -progress to 90 degrees abd ▪ <u>Week 8</u>: Prone scapular stabilization exercises <ul style="list-style-type: none"> -Initiate with gravity resisted motion ▪ <u>Week 9</u>: initiate light/submaximal triceps ISOM (25-50% effort & pain-free) ▪ Gradual Biceps Strengthening ▪ Resisted serratus anterior punch <ul style="list-style-type: none"> -NO weight bearing through extremity ▪ NO pressing activity for 12 weeks <ul style="list-style-type: none"> -No shoulder press, bench press, etc... <p>Neuromuscular Reeducation:</p> <ul style="list-style-type: none"> ▪ Supine rhythmic stabilization of shoulder <p>Functional Activity</p> <ul style="list-style-type: none"> ▪ <u>Week 10</u>: Stationary Bike and light jogging <ul style="list-style-type: none"> -Walk to jog progression programs

MILESTONES TO PROGRESS TO PHASE 4:

1. Full pain-free shoulder and elbow AROM
2. 5/5 MMT strength for shoulder and rotator cuff
3. 4+/5 or 5/5 MMT strength for scapulothoracic musculature
4. Pain-free elbow extension activation



Phase 4: Return to Sport/Recreational Activity (Weeks 12-16)

GOALS:

- Maintain non-painful and full shoulder and elbow AROM
- Progressive resistive isotonic loading of triceps
- Introduction of WB and pressing activity
- Return to sports-related activity

PRECAUTIONS:

- Progressive loading program should be incorporated, avoid unnecessary early activation
- If patient does not perform velocity dependent tasks during work/sport/ADLs do not perform plyometrics

CRITERIA FOR PLYOMETRIC TRAINING

1. Adequate strength of triceps and entire surgical extremity: MMT 4+/5 (70-80% bilateral comparison with handheld dynamometer)
2. Involved extremity Elbow Ext to Flex ratio >76% (isokinetic or handheld dynamometry testing)
3. Pain-free ADLs and with previous strengthening
4. Minimum 3 weeks of multi-plane activity at increased speed of movement

Weeks 8-12

PROM/AAROM/AROM

- End ROM mobility per deficits present

Strengthening

- Progress triceps isotonic loading (including eccentrics)
- Strengthening in PNF Patterns of Motion
- Week 12: Initiate CKC UE Activity/WB through surgical extremity
 - Initiate in standing, 25% body weight, wide hand positioning, and with mild elbow flexion
- UBE stationary ergometry
 - Short-duration and pain-free (2-3 minutes)
- Week 14: Introduce push-up progression
 - Initially in modified position (on knees) and limiting elbow flex to 45 degree

Energy Storage and Power Development

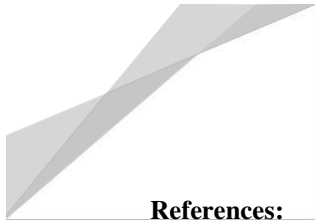
- Week 16: Initiate Plyometric Activity
 - Start with double-arm activity at chest height (chest pass)
 - Progress to single-arm activity (free throw)

Functional Activity

- Return to Sport at 5-6 months
 - Interval progressive sport programs

MILESTONES TO RETURN TO SPORT:

1. Muscular strength >90% bilateral comparison for rotator cuff & scapular stabilizers (handheld dynamometer)
2. Involved extremity Elbow Ext to Flex Ratio > 76% (isokinetic or handheld dynamometry testing)
3. Completion of an interval sport progression program



References:

1. Blackmore SM, Jander RM, Culp RW. (2006). Management of distal biceps and triceps rupture. *Journal of Hand Therapy*, 19(2): 154-169.
2. Dunn JC, Kusnezov N, Fares A, et al. (2017). Triceps tendon ruptures: A systematic review. *Hand*, 12(5): 431-438.
3. Kocialkowski C, Carter R & Peach C. (2018). Triceps tendon rupture: Repair and rehabilitation. *Shoulder & Elbow*; 10(1): 62-65.
4. Bennett JB & Mehlhoff TL. (2015). Triceps tendon repair. *J Hand Surg Am*; 40: 1677-1683.
5. Giannicola G, Bullitta G, Rotini R, Murena L, et al. (2018). Results of primary repair of distal triceps tendon ruptures in a general population. *The Bone & Joint Journal*; 100-B(5): 610-616.