DISTAL RECTUS FEMORIS TRANSFER

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DISTAL RECTUS FEMORIS TRANSFER (DRFT) – GENERAL

I. History of procedure
   a. Described in 1987 (Gage, Perry et al.)

II. Results
   a. Expectations
      i. Improved knee extension in stance
      ii. Improved arc of range from stance to swing
      iii. Improved timing of peak knee flexion in swing (though not universal)
   b. Compared to rectus release
      i. Better results than proximal release (Sutherland et al. 1990)
      ii. Better results than distal release (Õunpuu et al. 1993 and Chambers et al. 1998)
   c. Combination with proximal rectus release (no difference – Végyári et al. 2013)

III. Concerns
   a. Some authors focus on peak knee flexion in swing (and arc of ROM), but ignore knee flexion in stance

DISTAL RECTUS FEMORIS TRANSFER (DRFT) – PATIENT EVALUATION AND TREATMENT

I. Patient History
   a. Stiff knee
   b. Foot clearance/tripping problems
   c. GMFCS level

II. Physical exam
   a. Thorough physical exam
      i. ROM
      ii. Muscle strength and selectivity
   b. Duncan-Ely (prone rectus) test

III. Visual gait analysis
   a. Overall gait assessment
      i. All planes
      ii. Lever arm dysfunction?
b. Potential need for DRFT
   i. Stiff knee in swing
   ii. Foot clearance issues
   iii. Assess crouch and gait velocity

IV. Computerized gait analysis
   a. Overall gait
   b. Possible need for DRFT
      i. Knee kinematics/kinetics
      ii. Dynamic electromyography (EMG)

V. Indications for surgery
   a. Must meet BOTH kinematic and EMG criteria
      i. Kinematic: delayed timing and/or decreased magnitude of excursion of
         the knee from stance to swing phase
      ii. EMG: overactive rectus femoris on dynamic EMG
   b. GMFCS I and II children
      i. Risk of ongoing crouch in GMFCS III and IV

VI. Options for recipient of DRFT
   a. Semitendinosus (preferred, when available) – tendon to tendon transfer with
      non-absorbable sutures
   b. Gracilis
   c. Sartorius
   d. IT band

VII. Results
   a. ~7-15° improvement in the excursion of the knee from stance to swing phase
      i. Improved knee extension in stance and preserved knee flexion in swing
   b. Improvement in timing of peak knee flexion in swing phase

DISTAL RECTUS FEMORIS TRANSFER (DRFT) – TECHNIQUE FOR TRANSFER TO SEMI-T

I. RECTUS PREPARATION
   a. ~4 cm midline incision
      i. Dissection facilitated with tenotomy scissors placed in plane
         immediately anterior to quad tendon
   b. Clear off quad tendon
   c. Make 1-1.5cm longitudinal incision with cautery just medial to quad tendon
      i. Incision should be 2-3cm proximal to patella (since it is easier to
         separate rectus from vastus lateralis here than more distally)
      ii. Make sure to go deep to rectus tendon
   d. Use a Freer (or other) elevator to develop plane between rectus and vastus
      intermedius (VI)
      i. Correct plane is smooth and easy to define at this level
      ii. If plane is not easily defined, you are likely within the rectus tendon.
   e. Once the plane is identified, puncture through the quads immediately
      lateral to the rectus tendon
f. Bluntly dissect the rectus from the VI from proximal to distal.
g. Rectus tendon is transected ~ 5-10mm proximal to the patella.
   i. It is imperative that the rectus and VI have been separated distally (as above) in order to avoid penetration of the knee joint
   ii. Usually done medial to lateral to minimize risk of going too deep
h. Whipstitch is placed in the rectus stump (2-0 non-absorbable suture)
   i. An Allis clamp helps control the tendon during suturing
i. Rectus is freed proximally along both medial and lateral borders (for at least 5cm proximal to the incision) – most of this can be done bluntly
   i. Make sure that the rectus has at least 2-3cm of easy, untethered excursion at the completion of this step
j. Vastus lateralis and vastus medialis are approximated to one another using 2-0 absorbable suture with multiple figure-8 stitches
   i. Do not penetrate VI with these stitches
k. Dissect plane deep to fascia and superficial to quads
   i. Others do the plane superficial to fascia, but this layer is often thin in children with CP and does not, in my experience, work as well
l. Retract vastus medialis laterally (usually using Sofield or other right angle retractor), and incise intermuscular septum for 1-1.5cm with Bovie and extend this “window” in the septum for the length of the incision

II. SEMITENDINOSUS (ST) PREPARATION
a. 3-4cm midline incision in distal third of posterior thigh
b. Isolate ST and transect tendon just proximal to the musculotendinous junction
c. Place whipstitch in proximal end of ST stump with non-absorbable 2-0 suture
   i. An Allis clamp on the end of the tendon stump controls the tendon
d. Free ST distally to at least level of knee joint

III. COMPLETION OF TRANSFER
a. Bring ST into anterior wound (usually facilitated with tonsil clamp)
b. Make ST and rectus stumps co-linear, extend the knee and check overlap and tension.
c. Once the appropriate amount of overlap desired for transfer is determined, the knee can be flexed to 90° and the transfer completed (with the amount of pre-determined overlap as per above)
   i. If end-to-end, you can tie the ends of the non-absorbable whip stitches placed previously
   ii. If side-to-side, then use figure-8 stitches with non-absorbable 2-0 suture
d. Make sure the transfer has a direct line of pull and is not tethered by the surrounding soft tissues

IV. CLOSURE
a. For the anterior wound, I prefer a longer-lasting absorbable suture for the subcuticular layer (such as a clear 3-0 PDS) to decrease wound/scar spreading
DISTAL RECTUS FEMORIS TRANSFER (DRFT) – POST-OP

I. Weight-bearing as tolerated (unless contraindicated by other procedures)
II. ROM – I typically use a knee immobilizer for most of the day for 2-3 weeks
   (N.B. others recommend immediate ROM post-op)
   a. I have not found ROM to be an issue by avoiding immediate ROM
   b. Wound complications appear rarer without immediate ROM

SELECTED REFERENCES[1-11]