

A Simulation Study of Latissimus Dorsi Tendon Transfer (LDTT) for Irreparable Massive Rotator Cuff Tears (MRCT): Investigating the Ideal Fixation Point

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Summary:

Investigating the ideal fixation point for Latissimus dorsi tendon transfer in irreparable massive rotator cuff tear

Abstract:

Background: Latissimus dorsi tendon transfer (LDTT) represents preferred treatment for younger, active individuals with posterosuperior irreparable Massive Rotator Cuff Tears (MRCT), which has been shown to decrease pain and increase range of motion (ROM). The study seeks to find out the ideal fixation points for LDTT in posterosuperior irreparable MRCTs.

Methods: A computer model named "Stanford upper extremity model (SUEM)" and Opensim 3.3.0 software were modified to simulate conditions of normal shoulder, posterosuperior irreparable MRCT and posterosuperior irreparable MRCT with LDTT. We compare the moment, muscle arm and muscle force of the models above and evaluate five possible transfer locations adjacent to greater tuberosity to pursue the acceptable fixation point.

Results: In posterosuperior irreparable MRCT patients, there was up to 1/3 moment decrease at 0 degree abduction and 6/7 moment decrease at 20 to 30 degree external rotation. LDTT did not enhance abduction moment remarkably. However, the transferred Latissimus dorsi made contribution to enhance the external rotation moment up to 2 times than that of irreparable MRCT. When evaluating the ideal fixation point, we found superior point had a better moment generating potential for it could produce up to 5 Nm for shoulder abduction. When it came to external rotation, both posterior and anterior points' peak absolute moment were larger than that of other ones.

Conclusion: During surgery, LDTT fixation point could be placed posterior to the imagined line between center and superior point.