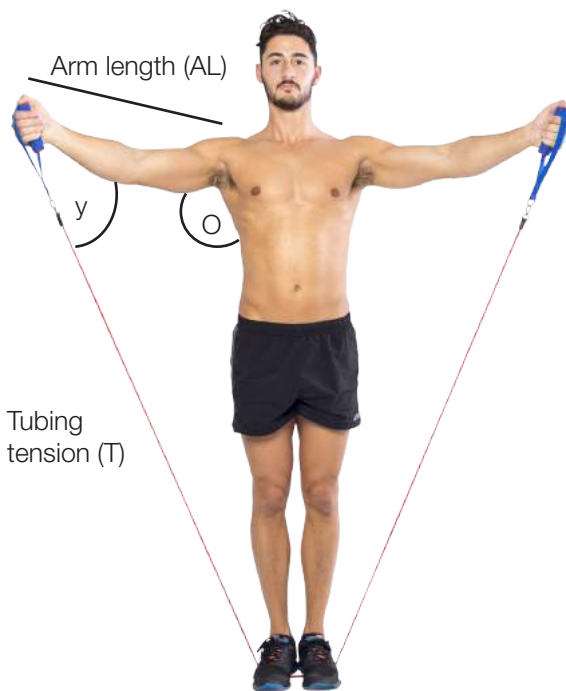


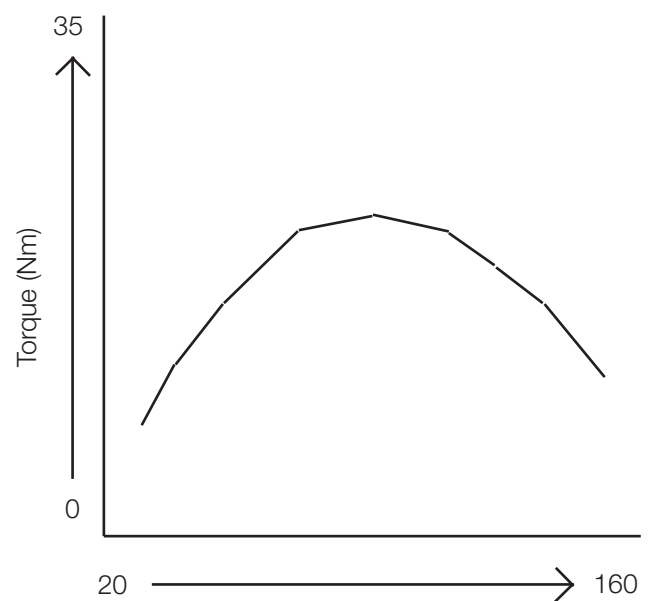
Elastic band torque patterns

Some experts have reservations about certain elastic band exercises. Kisner and Colby first discussed the potential disadvantage of elastic resistance suggesting that it makes it difficult for the patient to complete the end range of motion because the muscles are weakest at the point where the resistance is greatest.⁸ The concern is this is where passive structures are taking the load. However, a study in 1999 of standing shoulder abduction using elastic resistance indicated that the resistive torque follows an ascending-descending pattern with the greatest torque occurring near 90° of abduction.⁹ So, even though the resistance of the elastic band is increasing, as the joint angle increases the band-to-arm angle and shoulder abduction angle offset this linearity. This means that the torque required to elevate the arm follows a somewhat similar curve to the majority of muscle groups in the body (for shoulder abduction the strength curve tends to follow a descending pattern with greatest abduction strength early in the range of motion).¹⁰

Determining shoulder torque (after Hughes et al.)⁹



Representation of resistive torque curves (after Hughes et al.)⁹



y = band to arm angle

O = shoulder abduction angle (joint angle)

Torque by band = $AL \times T (\sin y)$

With correct placement of the elastic band both standing flexion and standing hug follow the ascending descending torque pattern. However, the other exercises in this prescription tend not to take advantage of the torque angle and more than likely the resistance is increasing towards the end range of motion. Some practitioners feel this is an advantage of elastic resistance – suggesting that this results in greater strength gains. However, you should start with low band resistance initially and prescribe these exercises at an appropriate stage of healing while monitoring patient progress carefully. Alternatively, if the facilities are available to the patient you can use cables as resistance.