**Obesity Impairs Enthesis Healing After Rotator Cuff Repair in a Rat Model**

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**Introduction**

Being overweight or obese is associated with poor outcomes and increased risk of failure after rotator cuff (RC) surgery. However, the effect of obesity on enthesis healing has not been well characterized. We hypothesised obesity would result in inferior enthesis healing in a rat model of RC repair, and a dietary intervention in the perioperative period would improve enthesis healing.

**Purpose**

This study aimed to understand: [1] the effect of obesity on enthesis healing after RC repair in a rat model, and [2] the independent pathogenic role of obesity in altering RC healing outcomes

**Methods**

Male Sprague-Dawley rats were divided into 3 weight-matched groups (n = 26 per group): control diet (CD), high-fat diet (HFD), or HFD until surgery and then CD thereafter (HF-CD). After 12 weeks, the left supraspinatus tendon was detached, followed by immediate repair. Animals were sacrificed, and RCs were harvested at 2- and 12-weeks after surgery for biomechanical and histological evaluations. Metabolic end points were assessed using dual-energy X-ray absorptiometry and plasma analyses.

**Results**

Obesity was established in the HFD and HF-CD groups before surgery and subsequently reversed in the HF-CD group after surgery. Histologically, the appearance of the repaired entheses was poorer in both the HFD and HF-CD groups compared with the CD group at 12-weeks after surgery, with semiquantitative scores of 6.2 (P<0.01), 4.98 (P<0.01), and 8.7 of 15, respectively. The repaired entheses in the HF-CD group had a significantly lower load to failure (P=0.03) at 12-weeks after surgery compared with the CD group, while the load to failure in the HFD group was low but not significantly different (P=0.10). Plasma leptin were negatively correlated with histology scores and load to failure at 12-weeks after surgery.

**Conclusion**

Obesity impaired enthesis healing in this rat RC repair model, with inferior biomechanical and histological outcomes. Restoring normal weight with dietary change after surgery did not improve healing outcomes. Circulating levels of leptin significantly correlated with poor healing outcomes. This pre-clinical rodent model demonstrates that obesity is a potentially modifiable factor that impairs RC healing and increases the risk of failure after surgery.