Assessment of Radiographic Features in Predicting Complete Quadriceps and Complete Patellar Tendon Ruptures in the Pre-Operative Setting

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Introduction

- Acute patellar tendon or quadriceps tendon rupture is a severely debilitating injury resulting in complete loss of the knee extensor mechanism.
- Early diagnosis and surgical repair are preferential in order to achieve good functional outcomes.
- In the setting of trauma and knee pain, plain film radiographs of the knee are obtained to rule out fractures and may also be used to diagnose the complete or partial rupture of one of these two tendons without the use of MRI.
- Patellar and quadriceps tendon rupture is primarily a clinical diagnosis; however, it may be beneficial to obtain additional imaging to differentiate between a partial and complete tear when uncertainty exists.
- Our goal is to assess the reliability and reproducibility of numerous radiographic measures on plain radiographs: Insall-Salvati,[1] Caton-Deschamps,[2] and Blackburne-Peel ratios,[3] as well as the soft tissue appearance of the bony insertion and focal intratendinous radiolucency in a population with acute traumatic isolated quadriceps tendon or patellar tendon ruptures.
- This study evaluates the hypothesis that plain radiographs are sufficient in the diagnosis of quadriceps tendon and patellar tendon complete ruptures.

Methods

- Two residents reviewed the charts, and calculated values for the Insall-Salvati,[1] Caton-Deschamps,[2] and Blackburne-Peel[3] ratios, as well as evaluated the soft tissue appearance of the bony insertion and focal intratendinous radiolucency.
- Sensitivity and specificity of these radiographic measures are will be evaluated between (1) quadriceps tendon rupture group vs control group and (2) patellar tendon rupture group vs control group.

Preliminary Results

- This study evaluated 23 patients with a mean age of 60.5 years and a BMI of 35.21, 15 of whom had quadriceps tendon ruptures and 8 had patellar tendon ruptures.
- Insall-Salvati[1] (1.77 ± 0.51 vs 0.96 ± 0.18, PT vs QT, respectively) and Caton-Deschamps[2] ratios (0.76 ± 0.35 vs 1.00 ± 0.18, PT vs QT, respectively) had high rater reliability with ICC and Cohen's Kappa values of 0.94 and 0.88.
- Blackburne-Peel ratio[3] and focal intratendinous radiolucency had fair to moderate reliability, and the reliability of other measurements varied, with the wavy appearance of the PT with moderate reliability (Cohen's Kappa of 0.55) and the FTL having the lowest reliability (Cohen's Kappa of 0.00).

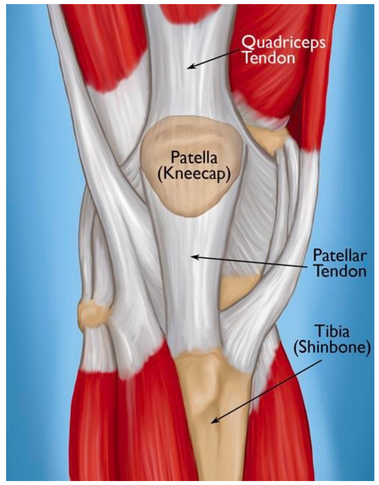

Figure 1: Quadriceps and Patellar Tendon Anatomy[4]

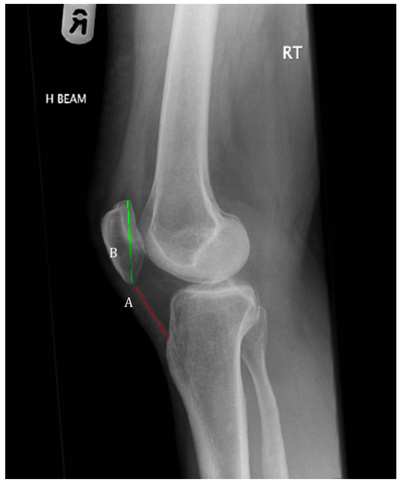

Figure 2: Insall-Salvati ratio (A/B)[5]

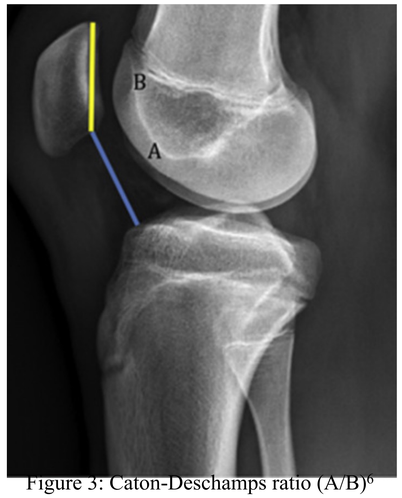

Figure 3: Caton-Deschamps ratio (A/B)[6]

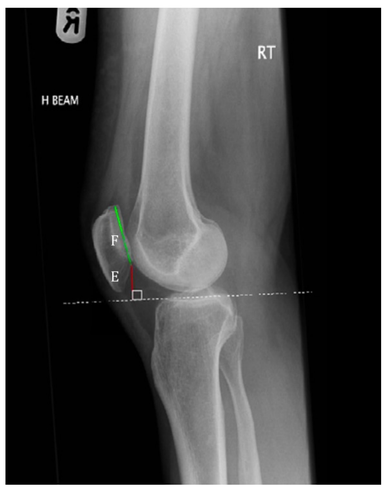

Figure 4: Blackburne-Peel ratio (E/F)[5]

Figure 5: Focal intratendinous radioluceny in a ruptured tendon[5]

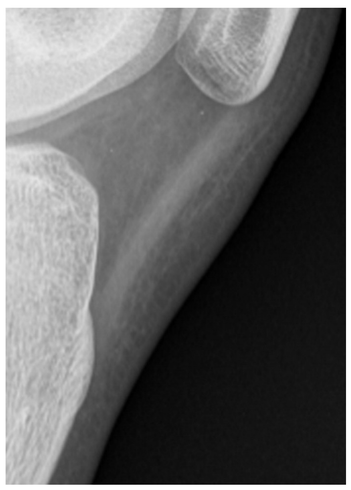

Figure 6: Focal intratendinous radioluceny in an intact tendon[5]

Discussion

- Confirmation of patellar tendon and quadriceps tendon ruptures rely heavily upon clinical diagnoses.
- In circumstances where diagnosis is uncertain based on physical exam alone, either due to patient habitus or knee swelling, further testing is often performed to confirm the diagnosis.

Conclusion

We conclude that plain radiographs are sufficient in the diagnosis of quadriceps tendon and patellar tendon complete ruptures, leading to a shorter time span between injury and diagnosis, minimizing time and hospital resources while improving patient outcomes.

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