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Strength of Arthroscopic Repair Constructs for Radial Tears of the Meniscus

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Summary:
Cadaveric testing of arthroscopic radial repair constructs concluded that a figure of eight with an additional horizontal suture construct produced the highest maximum failure load.

Abstract:
PURPOSE
To determine the effect of arthroscopic suture repair construct design on maximum failure load and stiffness for radial meniscus tears.

METHODS
In twenty cadaveric knees, radial tears were created arthroscopically at the junction of the body and posterior horn of the menisci with an 11-blade. Repair constructs were placed arthroscopically at the radial tear site. Four repair constructs were evaluated: 2 horizontal sutures placed in an inside-out fashion, 2 horizontal sutures placed in an all-inside fashion, 4 orthogonal horizontal/vertical sutures placed in an all-inside fashion, and a figure of eight with a simple horizontal suture construct placed in an all-inside fashion. The horizontal sutures placed in an inside-out fashion acted as a control, as this technique represents conventional repair for radial meniscus tears. Meniscus specimens were harvested and tested to failure on an Instron machine. The Kruskal-Wallis Test was used to evaluate for significance of maximal failure load and stiffness between groups.

RESULTS
The mean maximum failure loads were: 2 horizontal sutures inside-out 59 ± 17 N, 2 horizontal sutures all-inside 73 ± 13 N, 4 orthogonal horizontal/vertical sutures 87 ± 17 N, and figure of eight plus horizontal construct 113 ± 22 N. Inter-construct comparison revealed statistical difference between the figure of eight plus horizontal construct and all three remaining constructs (< 0.02) and the 4 orthogonal horizontal/vertical sutures when compared to the 2 horizontal sutures inside-out ($p < 0.01$). Statistical significance was not found between the 2 horizontal suture all-inside construct and the 4 orthogonal horizontal/vertical sutures nor between the 2 horizontal suture all-inside construct and the 2 horizontal suture inside-out construct ($p=0.2$, $p=0.7$). Stiffness was similar between all four constructs.

CONCLUSIONS
The all-inside figure of eight with a horizontal suture construct had significantly higher failure loads compared to the three other repair constructs tested, including a conventional inside-out repair. Complex suture patterns deliver higher failure loads for repair of radial meniscus tears.