BIOMECHANICAL EVALUATION OF A NEW
ARTHROSCOPIC KNOT: THE SYMMETRIC KNOT

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The purpose of the study was to evaluate the mode of failure and the arthroscopic properties of a new arthroscopic knot, named symmetric knot.
Knot slippage is the primary mechanism of failure of arthroscopic knots
The Symmetric Knot
Materials–Methods

The biomechanical performance of the new knot was evaluated using two suture materials (orthocord and fiberwire) and 3 loading rates, 1 mm/min, 50 mm/min and 75 mm/min.
The knots were created between the crossheads of a materials testing machine and their biomechanical properties in tension were evaluated.

The parameters measured were the maximum load, the stiffness of the material and the mode of failure.

The mode of failure was monitored using a special microscope mounted on the materials testing machine.
Results

The primary mode of failure of arthroscopic knots was in all cases breakage of the suture at the suture loop.
Orthocord Suture Breakage
Fibrewire Suture Breakage
Suture Breakage vs Knot Untying
Results

The strength of the knot was equal to the maximum strength of the suture material exceeding 350 N with both suture types.

The stiffness of the sutures was not significantly different.
Results

The major difference was the mode of failure.
brittle behavior with abrupt rupture after the maximum load was reached.
ductile behaviour

knot failure was progressive with sudden increases of its strength after the maximum load was reached due to increase of the material stiffness.
Conclusion

The symmetric knot exploits the biomechanical properties of new suture materials and consistently fails without untying.