BIOMECHANICAL EVALUATION OF A NEW ARTHROSCOPIC KNOT: THE SYMMETRIC KNOT

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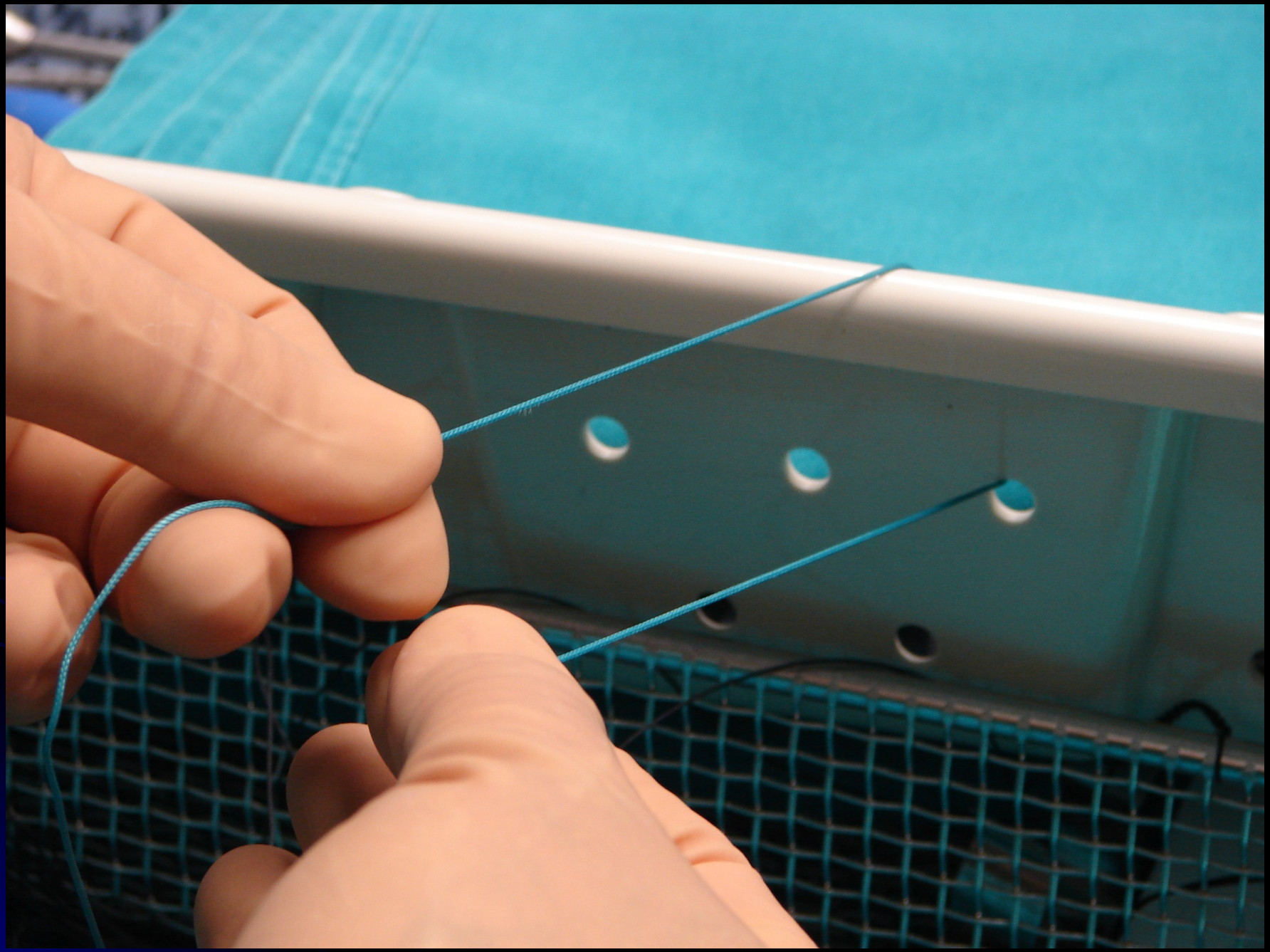
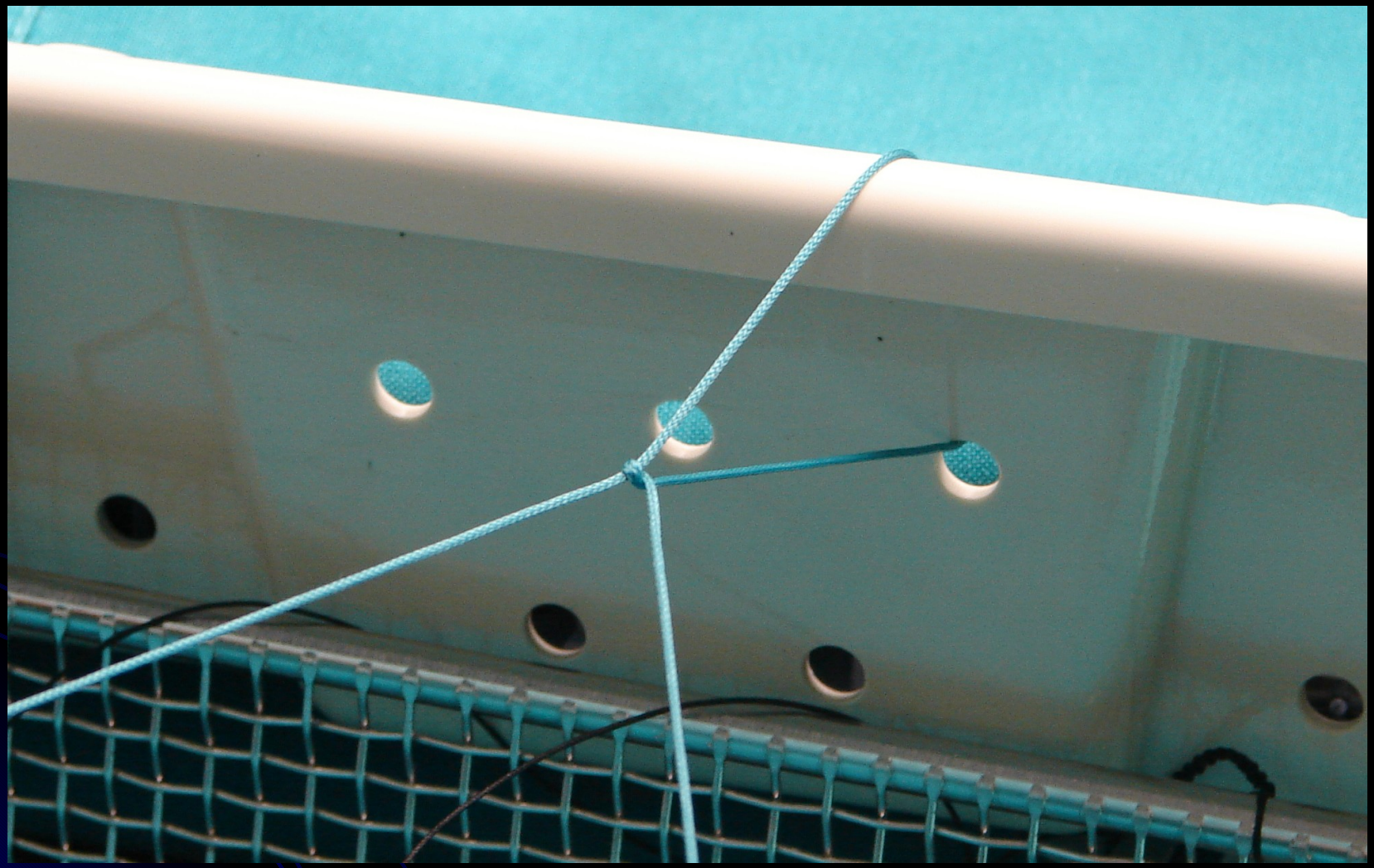
Purpose

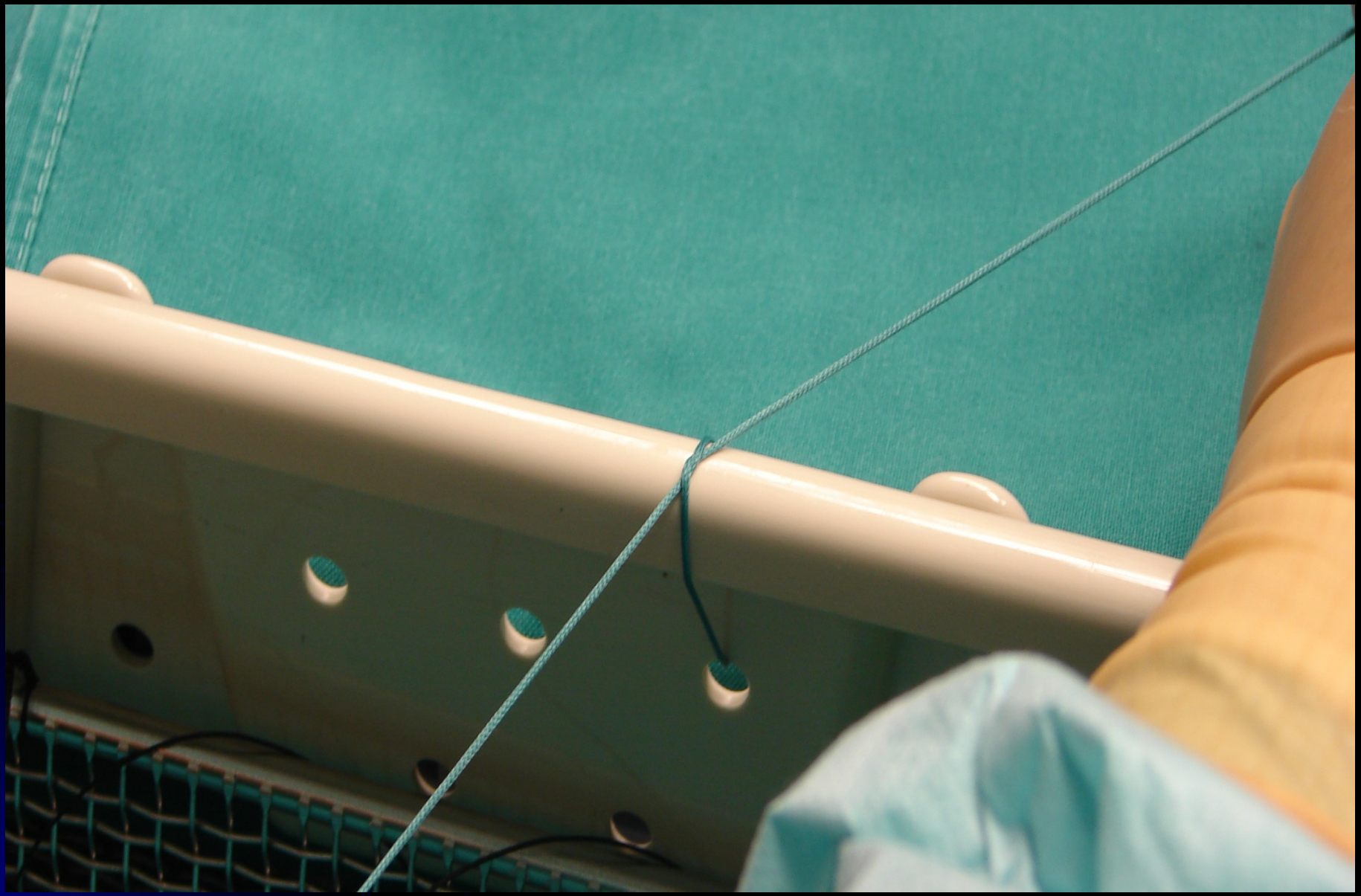
The purpose of the study was to evaluate the mode of failure and the arthroscopic properties of a new arthroscopic knot, named symmetric knot.

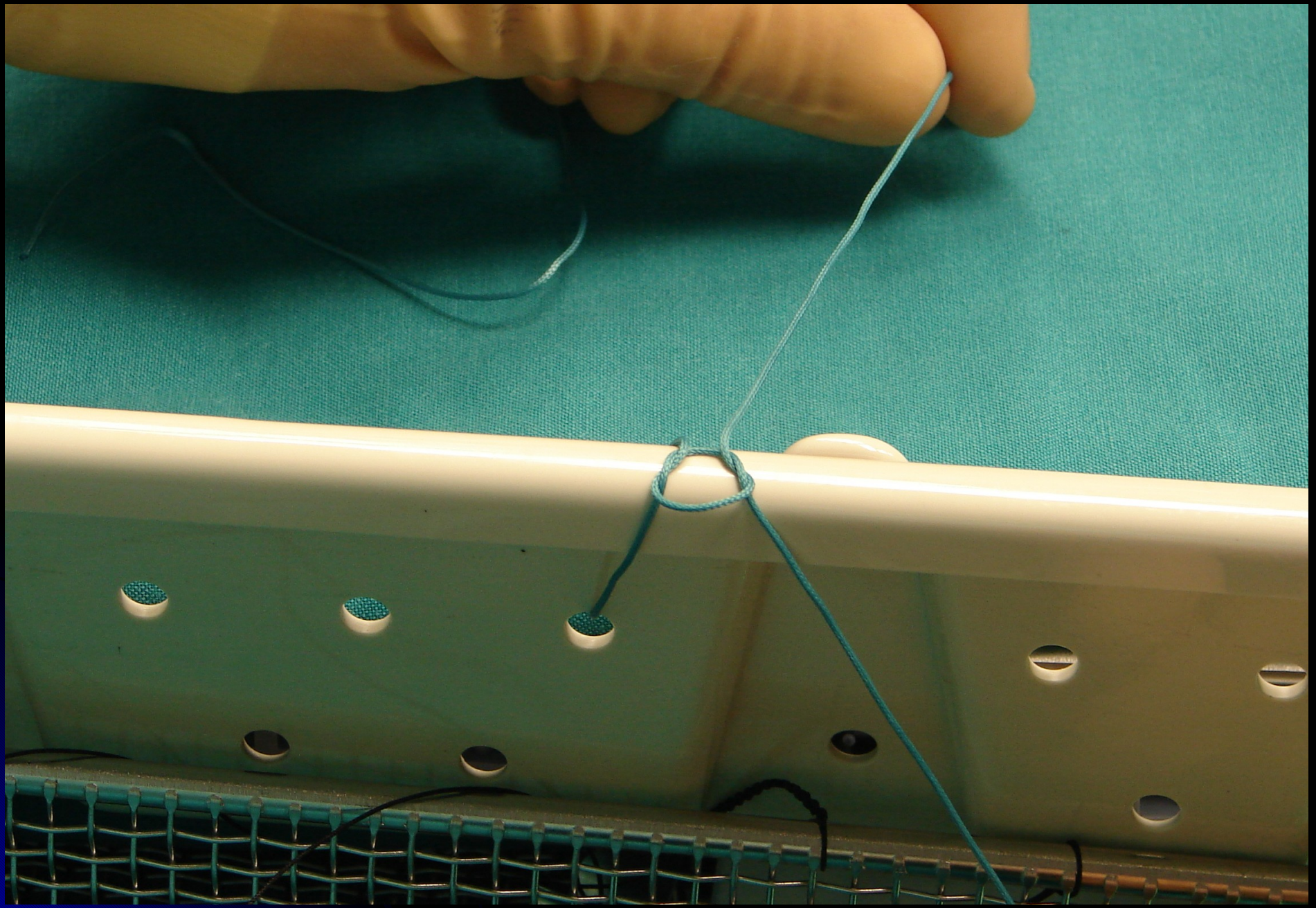
Knot slippage is the primary mechanism of failure of arthroscopic knots

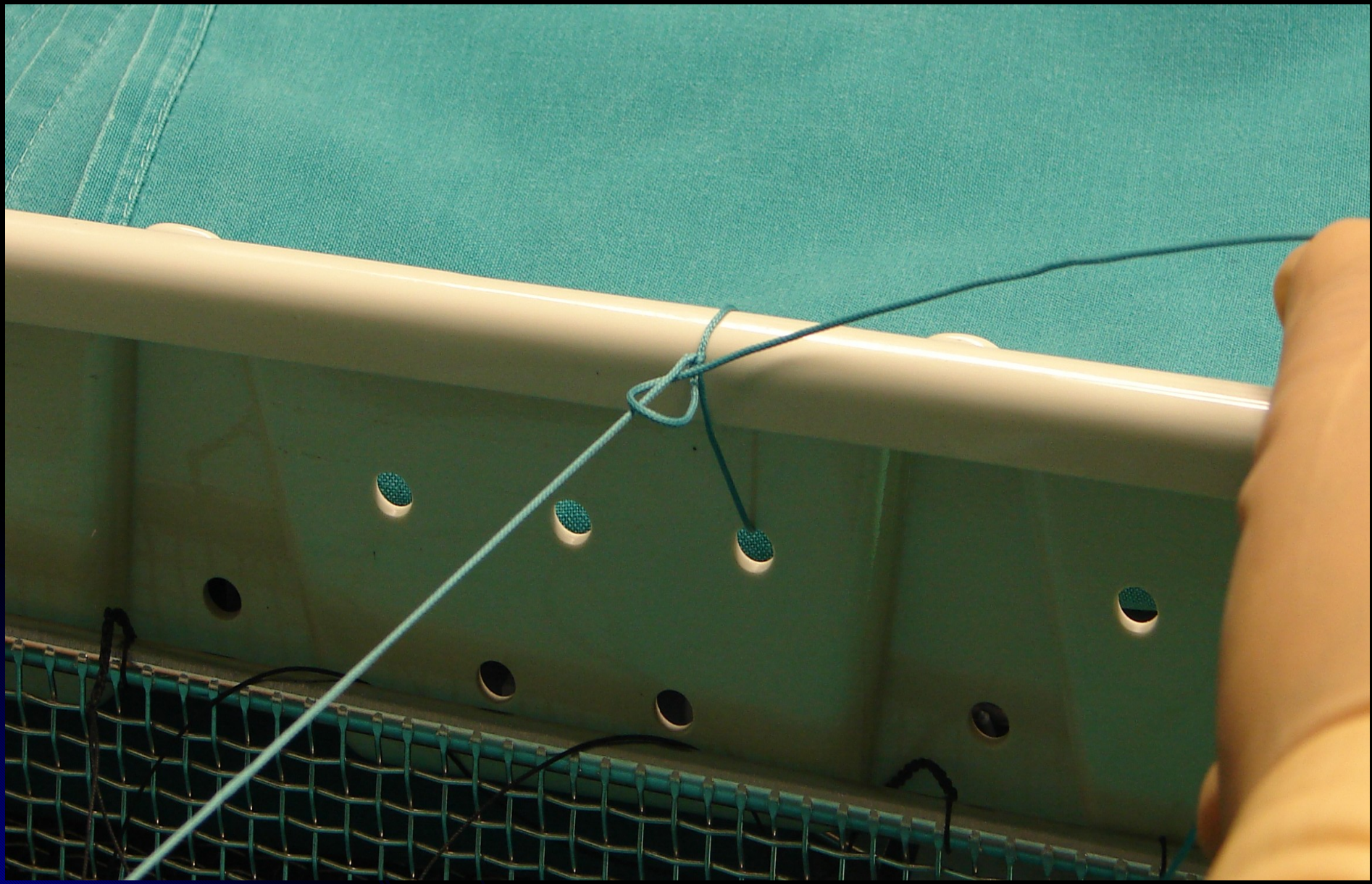
The Symmetric Knot

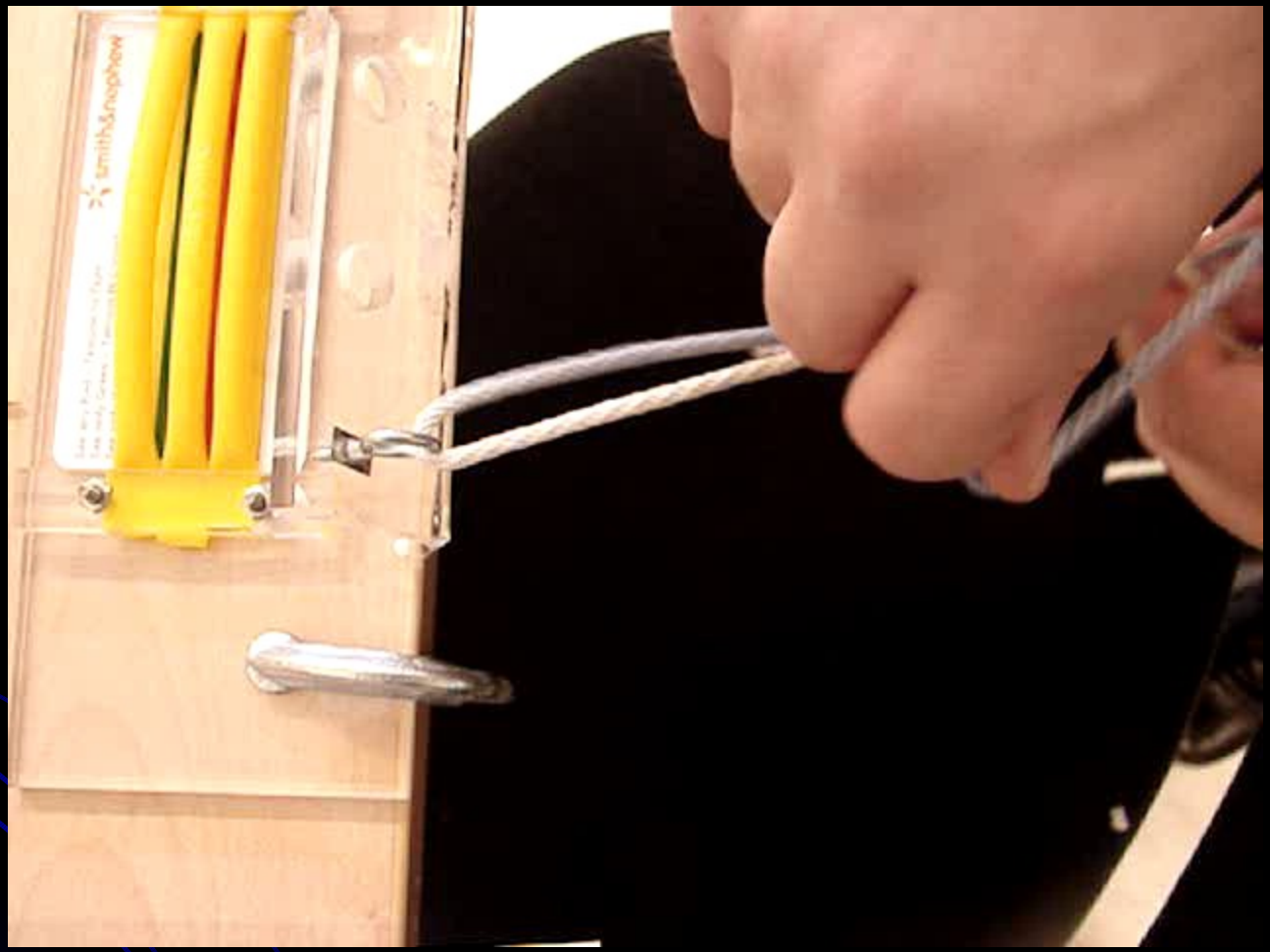











smith&nephew

Materials-Methods

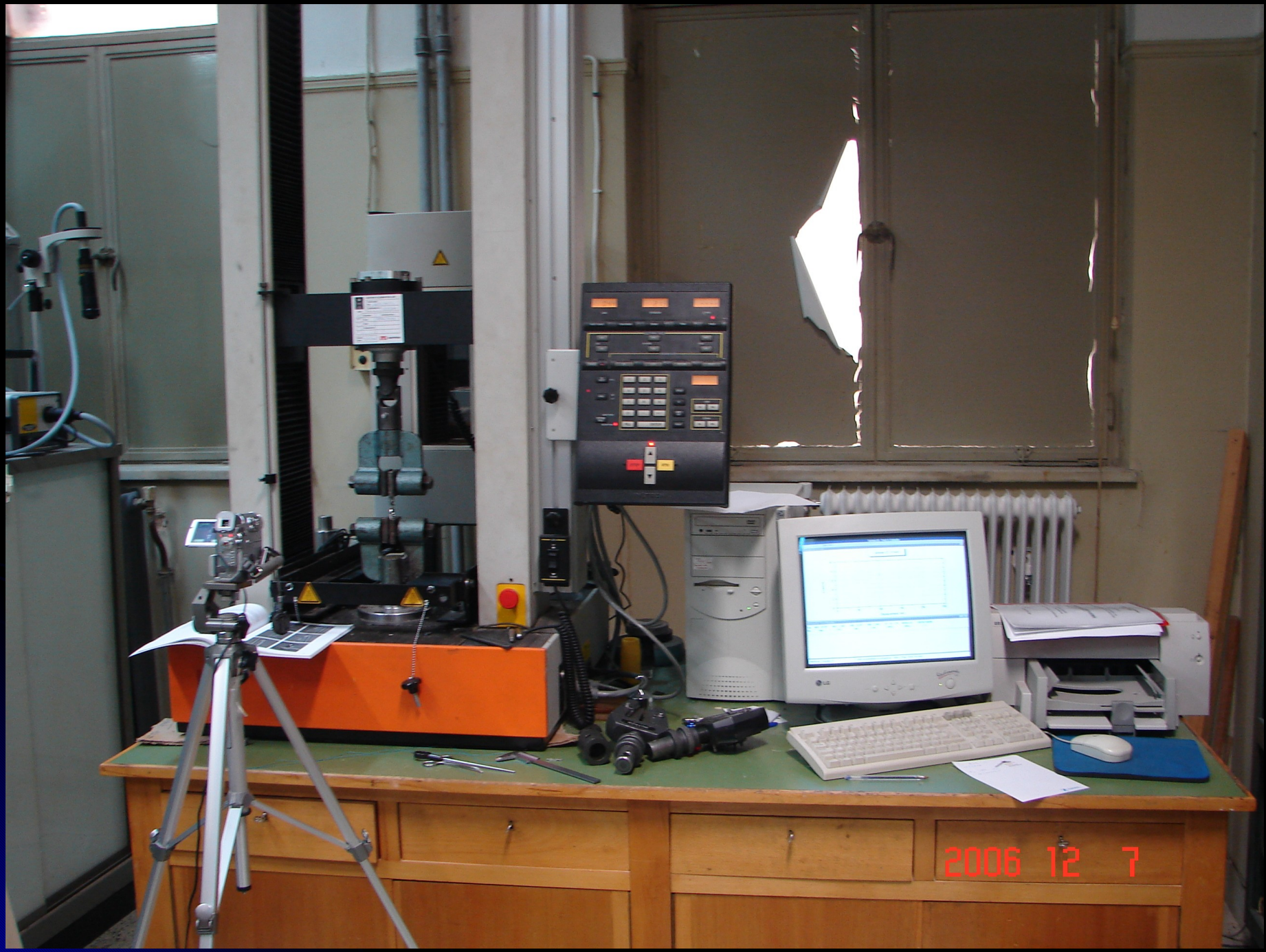
The biomechanical performance of the new knot was evaluated using two suture materials (orthocord and fiberwire) and 3 loading rates, 1 mm/min, 50 mm/min and 75 mm/min.

Materials-Methods

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.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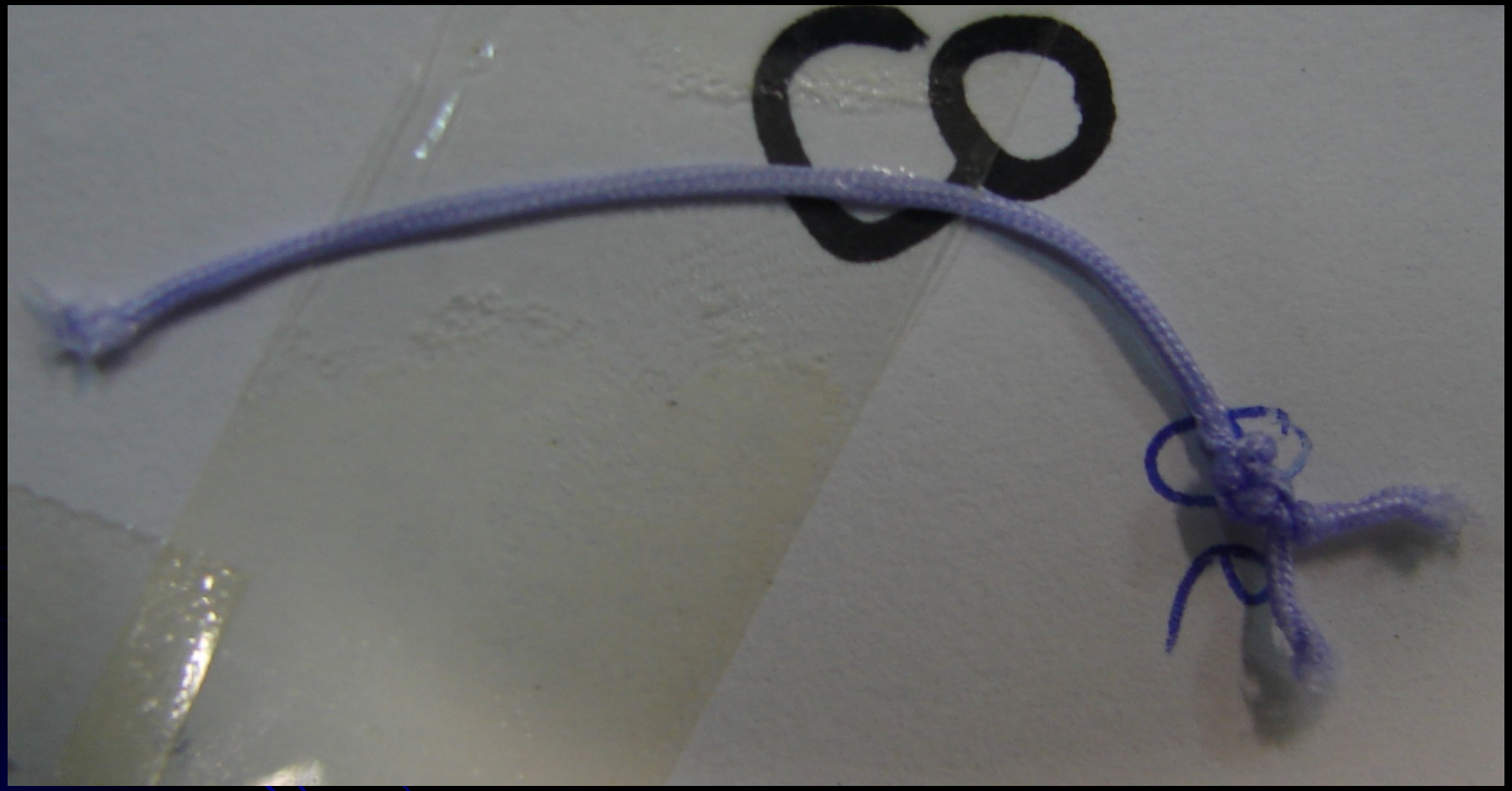
Results

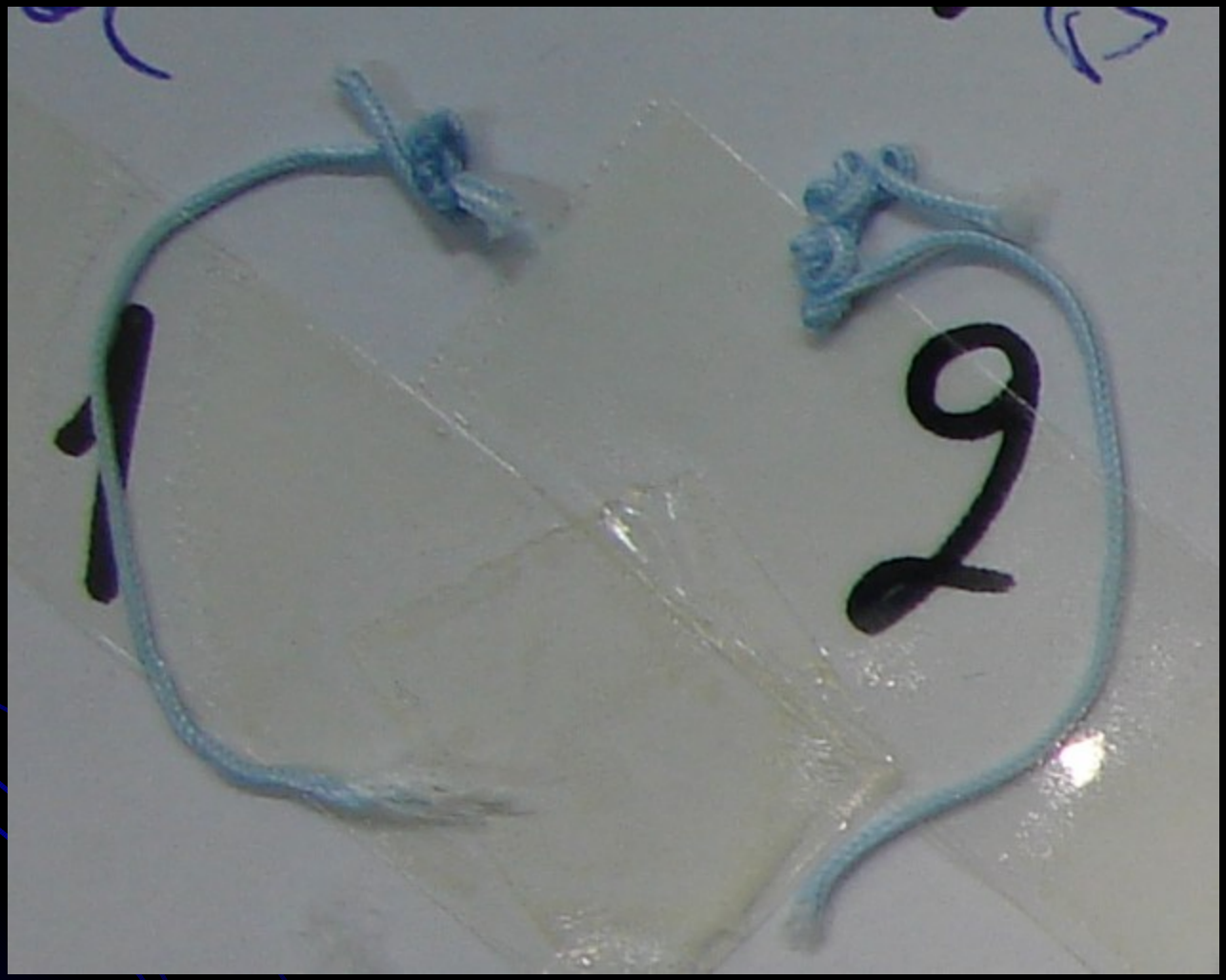
The primary mode of failure of arthroscopic knots was in all cases breakage of the suture at the suture loop.

Orthocord Suture Breakage



Fibrewire Suture Breakage

Suture Breakage vs Knot Untying



Results

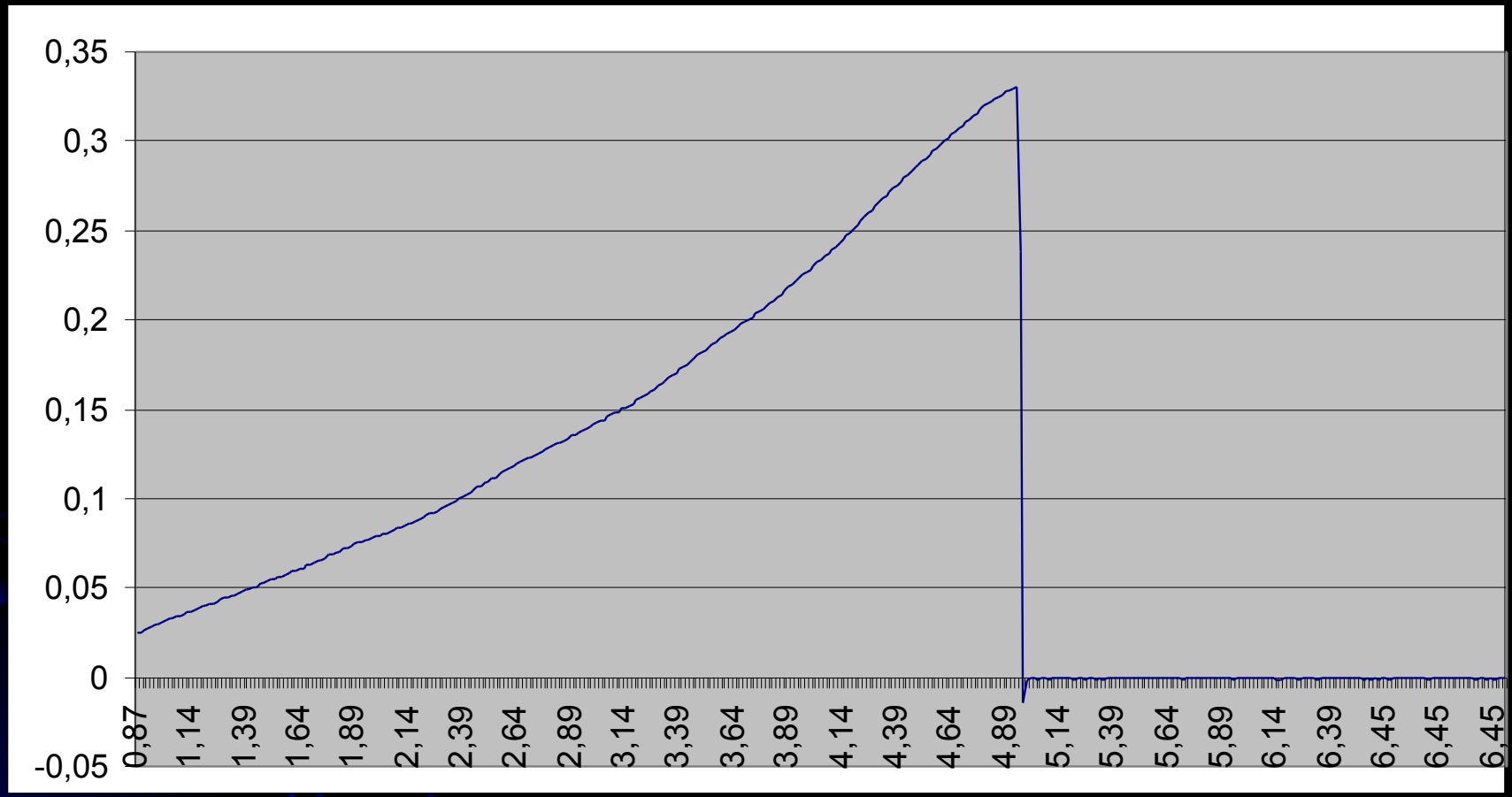
The strength of the knot was equal to the maximum strength of the suture material exceeding 350 N with both suture types.

The stiffness of the sutures was not significantly different.

Results

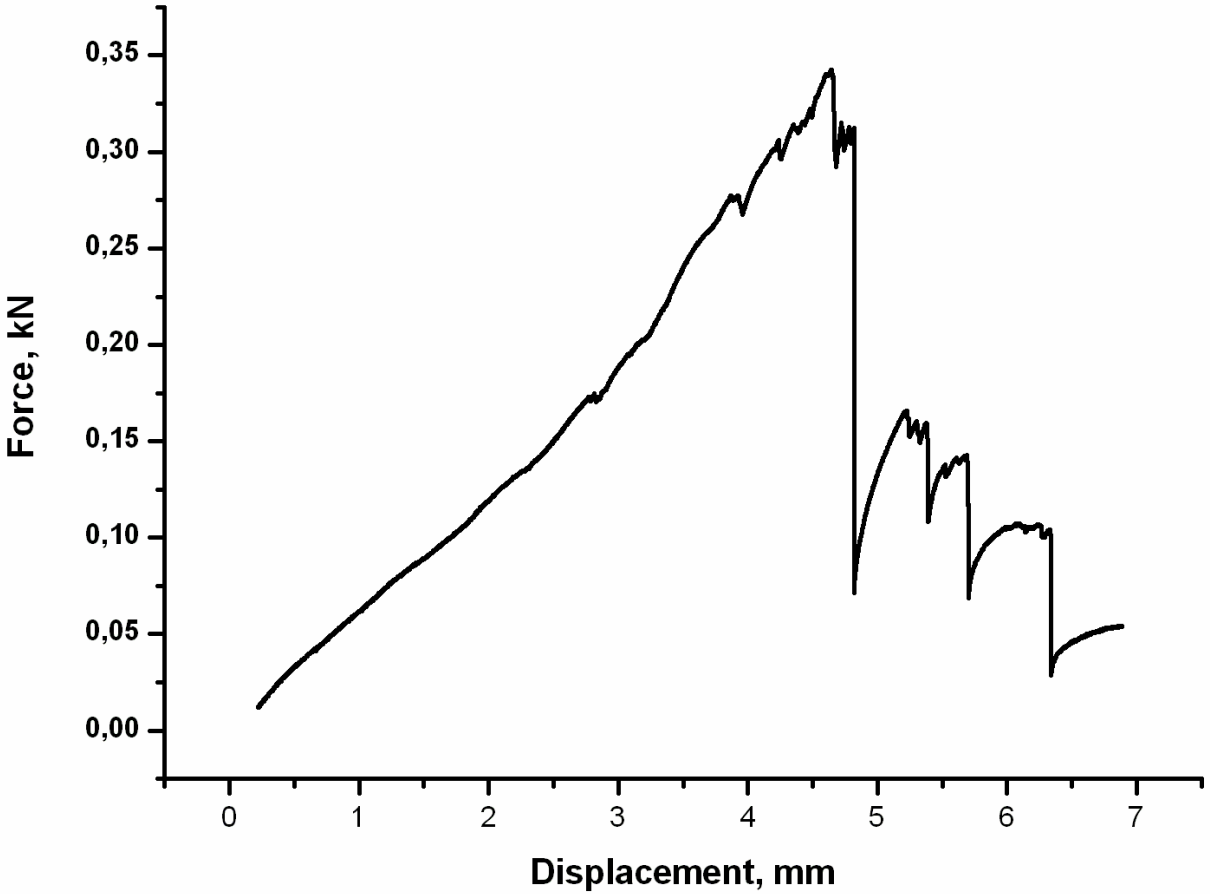
The major difference was the mode of failure.

orthocord



brittle behavior with abrupt rupture
after the maximum load was reached.

fiberwire



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.