MODE OF FAILURE OF ARTHROSCOPIC KNOTS

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Slip knots: Duncan, Lieurance Modified Roeder, Ten

Flip knots: SMC, Weston, Snyder, and Dines.
The purpose of the study was to evaluate the mode of failure and the biomechanical properties of 3 arthroscopic knots.
Materials-Methods

- three arthroscopic knots (square, revo, hangman’s)

- 3 types of suture materials (orthocord, fiberwire, ethibond)
Materials-Methods

The knots were created between the crossheads of a materials testing machine and their biomechanical properties in tension were evaluated with a strain rate of 1 mm/min and 50 mm/min.
The parameters measured were:

- knot security
- maximum load
- stiffness of the material
- mode of failure
The mode of failure was monitored using a special microscope mounted on the materials testing machine.
Results

With ethibond suture breakage was the major mode of failure and suture untying was uncommon.

In contrast, with the new generation sutures knot untying was the major mode of failure.
orthocord
fibrewire
Results: Mode of Failure

- Untying:
  - Square: 57
  - Revo: 62
  - Hangman's: 68

- Breakage:
  - Square: 6
  - Revo: 9
  - Hangman's: 8
Results: Knot Security

Knot security was least using ethibond compared with the other suture materials.
The square knot was less stiff and weaker than the revo or the hangman’s knot.

Results: Strength

<table>
<thead>
<tr>
<th></th>
<th>Ethibond</th>
<th>Orthocord</th>
</tr>
</thead>
<tbody>
<tr>
<td>square</td>
<td>48</td>
<td>79</td>
</tr>
<tr>
<td>revo</td>
<td>76</td>
<td>156</td>
</tr>
<tr>
<td>hangman's</td>
<td>94</td>
<td>189</td>
</tr>
</tbody>
</table>
Results: Stiffness

- **Ethibond**
  - square: 19
  - revo: 41
  - hangman's: 64

- **Orthocord**
  - square: 34
  - revo: 68
  - hangman's: 89
Conclusion

The use of new generation materials increases the strength of the knot but the issue of knot security still remains.