Evidence in focus

Publication summary

Douglass NP, et al. *Arthroscopy* (2017)*

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Anchor design and bone density impacts on cyclic and load to failure properties of all-suture anchors (ASAs)

ASA performance varies widely among anchor types and test-block densities

Study design

- Biomechanical study evaluating cyclic displacement, load to failure and ultimate failure mode of multiple ASAs
  – Q-FIX® 1.8; SUTUREFIX® ULTRA 1.7; JuggerKnot™ (Zimmer Biomet) 1.45 (#1 suture), 1.45 (#2 suture), 2.9; Y-Knot™ Flex (ConMed Linvatec) 1.3, 1.8; Iconix™ (Stryker) 1, 2, 25, 3
- Anchors tested in both 20 and 30 pounds per cubic foot (pcf) synthetic test-blocks to mimic the properties of acetabular and glenoid cancellous bone; BIORAPTOR® 2.3 PEEK anchor used as a non all-suture-based control

Key results

- All ASAs show better fixation in higher density synthetic bone
- The Q-FIX 1.8, however, performed better than all anchors in displacement and had maximum failure loads comparable with the highest values of the other anchors tested

Peak displacement at cycle 200

Q-FIX 1.8 showed significantly less peak displacement than all other ASAs in both 20 pcf ($p \leq 0.001$) and 30 pcf ($p \leq 0.025$) test blocks

Peak displacement at cycle 400 and post-cyclic displacement

In 20 pcf test blocks, Q-FIX 1.8 showed significantly less peak displacement and post-cyclic displacement compared with all anchors ($p \leq 0.002$)

In 30 pcf test blocks, Q-FIX 1.8 showed significantly less peak displacement ($p \leq 0.013$) than all other ASAs except Iconix 25, and significantly less ($p \leq 0.016$) post cyclic displacement compared with all anchors except Iconix 25

Maximum load and displacement at maximum load

In both 20 pcf and 30 pcf test blocks, Iconix 25 had the highest maximum load (196N and 307.1N respectively)

In 20 pcf test blocks Q-FIX 1.8 showed significantly less displacement at maximum load compared with all anchors ($p \leq 0.002$); and in 30 pcf significantly less ($p \leq 0.009$) than most ASAs with the exceptions of SUTUREFIX ULTRA 1.7, JuggerKnot 1.45 (#2 suture) and Iconix 2

Conclusion

The performance of ASAs varies widely depending on anchor design and bone density, with better fixation seen in higher density synthetic bone. The notable difference in performance seen with Q-FIX 1.8 could be associated with its unique active deployment mechanism.

Study citation

*Douglass NP, Behn AW, Safran MR. Cyclic and Load to Failure Properties of All-Suture Anchors in Synthetic Acetabular and Glenoid Cancellous Bone. *Arthroscopy*. 2017;33:977-985.

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