

Biomechanical Evaluation of the Biomet Sports Medicine JuggerKnot™ Soft Anchor in Porcine Bone

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Biomet Sports Medicine has recently developed a new suture anchor that may eliminate many concerns in soft tissue repair associated with bone loss and hardware issues. This unique 1.4mm anchor, created from a soft strand of polyester suture, combined with high strength MaxBraid™ Suture, may prove to be a useful tool to mitigate any surgeon concerns with currently available suture anchors.

METHODS

Ten JuggerKnot™ Soft Anchors, loaded with a single size #1 MaxBraid™ suture, were implanted into the distal cortex of a porcine femur following the methods used in a well-accepted study¹ Arthrex PEEK-Optima® SutureTak™ Anchor was tested. The permanent anchoring component of the JuggerKnot™ anchor consists of a short strand of polyester suture. Application of tension to the #1 suture causes the anchor to deploy, increasing its diameter.

The static load testing was performed, at 1.18mm/sec until failure, on a Sintech S/1 Screw Machine (GPP-1257 - 3C, Serial #128907A).

RESULTS

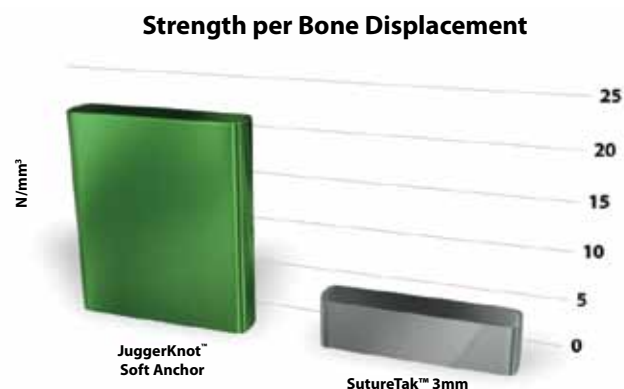
The pullout data of the JuggerKnot™ Soft Anchor is compared with the Arthrex PEEK-Optima® SutureTak™ Anchor in Table 1 below.

Table 1
Strength and Bone Removal of JuggerKnot™ Soft Anchor and PEEK-Optima® SutureTak™ Anchor

Implant	Avg. Peak Load (N)	Anchor Volume (cc)
JuggerKnot™ 1.4mm	190.6	.009
SutureTak™ 3mm ^{1,2}	168.1	.046

DISCUSSION

As can be seen in Table 1, the average pullout force of the smaller JuggerKnot™ anchor is comparable to the SutureTak™ anchor. Figure 1 synthesizes this data to show the strength achieved relative to the amount of bone displaced by the anchor.



Strength achieved by suture anchors with respect to the bone disruption.

Consideration of the strength achieved by a given anchor with respect to the bone disruption highlights an important dimension in suture anchor selection.

CONCLUSION

While providing fixation strength comparable to larger suture anchors, the JuggerKnot™ anchor also demonstrates surprising economies of bone preservation seldom explored to date. The importance of bone conservation is inherent as it is always a goal to minimize collateral damage to healthy anatomy.

The all-suture construction is porous, allowing the potential for blood flow through it. An additional significant advantage is the fact that 1.4mm is less than what has been shown in many animal studies⁴⁻⁶ to be a critical size defect.

This study shows that despite its unusual construction, the JuggerKnot™ Soft Anchor provides adequate fixation strength, while minimizing bone disruption, osteolysis and implant migration concerns.³

1. Barber FA, Herbert MA, Beavis RC, Oro FB. Suture Anchor Materials, Eyelets, and Designs. *Arthroscopy* 2008;24:859-67.
2. Volume estimate based upon 3mm x 12mm anchor, 2.3mm minor, 1.5mm cannulation.
3. Data on file at Biomet Sports Medicine, Inc. Bench test results are not necessarily indicative of clinical results.
4. Horner, EA, *et al.*; "Long Bone Defect Models for Tissue Engineering Applications: Criteria for Choice" In Press.
5. Bosch, C. *et al.*; "Importance of critical-size bone defect in testing bone-regenerating materials" Department of Orthodontics, Royal Dental College, Aarhus University, Denmark.
6. Aybr, OA, *et al.*; "An experimental model in calvaria to evaluate bone therapies" *Acta Odontol Latinoam*, 18(2): 63-7, 2005.

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