DYNACORD™ Suture: Comparative Monitoring of the Compression Force using Pressure Film
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OBJECTIVE:
The use of suture to approximate soft tissue is a common technique used during surgery. Suture is typically attached to an anchor, passed through tissue, and then a knotted or knotless technique is utilized to compress the tissue back down to the attachment site. Although the use of sutures and anchors is the preferred method to complete these repairs, there are properties of suture such as laxity, creep and knot slippage, in addition to uncontrollable factors including bone/tissue quality and patient non-compliance, all of which can negatively impact the maintenance of tissue compression during the healing period. The main objective of this study is to evaluate the ability of suture to maintain a compression force (Figure 1) for DYNACORD™ Suture (DePuy Synthes Mitek Sports Medicine, Massachusetts) and FiberWire® suture (Arthrex, Florida) on a simulated double row repair using Tekscan pressure film (model 4205).

DYNACORD™ SUTURE TECHNOLOGY:
DYNACORD #2 Suture is a high strength orthopedic suture that is composed primarily of an outer Ultra High Molecular Weight Polyethylene (UHMWPE) sheath, inner polyester (PET) sheath and a silicone/NaCl filled core. When DYNACORD Suture is placed in an aqueous environment, the salt particles within the silicone core elute out, leaving behind a micro-porous structure within the silicone core. These small voids are consequently filled with fluid as the core hydrates, resulting in a radial expansion of the suture braid. This radial expansion of the braid causes an axial shortening of the total suture length (Figure 2).

METHODS:
A simulated double row repair was created with DYNACORD and FiberWire Sutures (Size #2). A Tekscan pressure film sensor was utilized to monitor the amount of compression applied across the repair over a 72-hour period. Two medial row anchors were inserted into sawbones media. The Tekscan sensor and representative tissue (Syndaver-Rotator Cuff media) were placed on top of the sawbones media. Sutures from the medial anchors were passed and spanned over the representative media and sensor to a lateral row fixture (Figure 3). Two loops were created at the end of the sutures where a 20lb weight was secured. This load was selected as it was found to be a typical force applied while spanning to a lateral row anchor (20-26lbs - Park; AJSM 2015; Optimum Tension is Transosseous equivalent Rotator Cuff Repair). This fixture was used instead of typical lateral row anchors to reduce the variation in the compression applied across the
sensor from sample to sample and to securely lock in the initial compressive force. After the repair was completed, the entire construct was submerged in 0.9% saline. The Tekscan I-scan software immediately captured the initial compressive force applied to the simulated repair and at 65 second intervals for the next 72 hours.

The representative change in compression force over the simulated double row repair was also displayed from the I-scan software (Figures 5 & 6).

**RESULTS:**
The ability of both DYNACORD and FiberWire Sutures to maintain the compression force set on the simulated repair was reported. After 72 hours in a simulated environment, the average remaining compression force vs. starting force was an average percent change of -2.35% ± 8.1% for DYNACORD Suture and -36.09% ± 6.7% for FiberWire suture (Figure 4).\(^3\) The overall results show a statistical difference with a confidence level greater than 95% \((p\text{-value} < 0.05, n = 5\) per suture).\(^3\)

**CONCLUSION:**
The results highlight DYNACORD Suture’s innovative technology designed to maintain a more consistent compression force across a repair. The ability of DYNACORD Suture to expand radially and contract axially allows the suture to mitigate negative aspects of a repair such as suture laxity, creep, knot slippage or the potential impact of patient non-compliance. The remaining compression force across the Tekscan sensor is statistically greater for DYNACORD Suture when compared to FiberWire suture. In summary, DYNACORD Suture is uniquely designed to maintain the initial tissue to bone compression force, thus minimizing gap formation.

**REFERENCES:**
(2) Park J, American Journal of Sport Medicine, Vol 43, No. 9; Page 2118 – 2125.