GLIDING RESISTANCE AND BREAKING STRENGTH OF SUTURE TECHNIQUES WITH KNOTS INSIDE THE REPAIR SITE

Introduction: Early mobilization enhances tendon healing and significantly reduces tendon adhesions (1). To achieve a breaking strength which exceeds light grasping and pinching forces, newer suture techniques with increased tensile strength have been developed. Multiple-strand suture techniques showed increased breaking strength (2), but some multiple-strand suture techniques are technically difficult, time consuming, bulky, and increase manipulation of the tendon (3). The additional suture material placed outside of the tendon may increase gliding resistance and adhesion formation. A knot located within the laceration site has a theoretical benefit of decreasing gliding resistance and thereby adhesion formation (4). The purpose of this study was to measure gliding resistance between pulley and flexor tendon and suture breaking strength with three newer constructs and one traditional method that may combine high breaking strength with low gliding resistance.

Materials and Methods: 80 flexor profundus tendons from 10 dogs were used. The dogs had been sacrificed for other purpose. The second, third, fourth and fifth digits of each hindpaw were dissected. The flexor digitorum profundus (FDP), A2 pulley, and proximal and middle phalanx were preserved. Forty tendons were used to measure breaking strength and forty tendons were used to measure gliding resistance. A 100% laceration was made at a level just distal to the A2 pulley and then one of four randomly assigned suture techniques, and gliding resistance was measured again. The additional suture material placed outside manipulation of the tendon (3). The increased breaking strength with three newer constructs and one traditional method that may combine high breaking strength with low gliding resistance.

Discussion: In a multiple-strand suture method the repair site is apt to become bulky and increase tendon volume and gliding resistance. The increased complexity of multiple-strand techniques necessitates increased operative time and tendon handling, which correlates with increased postoperative adhesion formation (6), but multiple-strand suture techniques are better for the application of early controlled passive and active mobilization, because they have a higher breaking strength than repair techniques with fewer strands (3,6). Gliding resistance of the newer, knot inside multiple-strand suture methods tested here was lower than that for the knot-outside Tsuge technique. These newer multiple-strand sutures were easily made using looped sutures, which decreases tendon handling, such multiple-strand suture methods may be valuable clinically in producing high repair strength while minimizing gliding resistance.

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Fig. 2 Breaking strength of four suture techniques

Fig. 3 Gliding resistance of four suture techniques