

Small intestine submucosa: Intrinsic and anastomotic tensile strength of SIS using laser welding, fibrin glue, vascular closure staples, endo-GIA staples and sutures.

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Abstract:

Small intestinal submucosa (SIS) has been used for the reconstruction of urinary-tract segments. Its utility as a graft material for bladder reconstruction has been somewhat limited by the 7 cm circumference of the porcine small intestine. Accordingly, we studied several anastomotic techniques using an in vitro model. Tensometry data were collected for: dehydrated SIS (2 cm x 1 cm); SIS hydrated for 5, 10, 15, 60, 120 and 180 min; and SIS anastomosed to self and to porcine bladder using: (a) 4-0 Vicryl sutures, (b) KTP laser welding with 50% albumin solder, (c) fibrin glue, (d) vascular closure clips (VCS), or (e) endo-GIA vascular staples. Tensometry for porcine bladder, dehydrated SIS and SIS hydrated for 5, 10, 15 and 60 min was similar (5.0-6.7 N). SIS hydrated for 120 and 180 min had significantly higher breaking strengths (10.9 and 13.2 N, respectively; $p < 0.05$). Suturing and endo-GIA stapling of SIS to self and bladder produced anastomoses equivalent to the strength of intact SIS. The KTP laser, fibrin glue and VCS produced weak anastomoses, all < 1.0 N. Hydration of SIS for 2 h nearly doubles the tensile strength of the material. Suturing and endo-GIA stapling of strips of SIS produces an anastomosis equivalent in strength to native SIS.