DETERMINING THE EFFECT OF MESH WIDTH AND FIXATION PATTERNS ON THE STRENGTH OF PROPHYLACTICALLY REINFORCED LAPAROTOMY INCISIONS

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Aim: Research indicates that prophylactic mesh may help prevent incisional hernia after laparotomy, but best practice patterns in these
situations are still evolving. Here, we compare the failure loads (FLs) and biomechanical stiffness (BMS) of 35 porcine abdominal wall laparotomy incisions reinforced with meshes of various widths and fixation distances using biomechanical testing.

**Material and Methods:** In each specimen, a ten centimeter (cm) incision was made and closed using continuous 1-0 Maxon suture. Specimens were randomized to mesh width (none, 2.5cm, 3cm, 4cm, 6cm, 8cm) and tack separation (1.5cm, 2cm apart), and the meshes secured in an onlay fashion. Cyclic loads oscillating from 15 Newtons (N) to 140N were applied to stimulate abdominal wall stress, and the specimens subsequently loaded to failure. FLs (N) and BMS (N/mm) were comparatively analyzed.

**Results:** All specimens failed via suture pull-through. FLs and BMS were lowest in specimens with suture-only (421.43 N; 11.69 N/mm). FLs and BMS were significantly higher in 4cm mesh specimens (567.51N) than those with suture, 2.5cm, and 3.0cm mesh (all p < 0.05). FLs in specimens with a greater number of tacks were consistently higher in meshes of similar sizes, although these did not reach significance.

**Conclusions:** Four cm mesh re-enforcement is superior to suture-only and smaller meshes at preserving strength in laparotomy closure in the early stages of healing, but larger meshes (6cm, 8cm) do not provide additional benefit. Meshes with more fixation points may be advantageous, but additional data is needed to make definitive conclusions.