

"A Retrospective Analysis of Recto-Enterocoele Repair with SurgiSIS® Biomesh"

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BACKGROUND

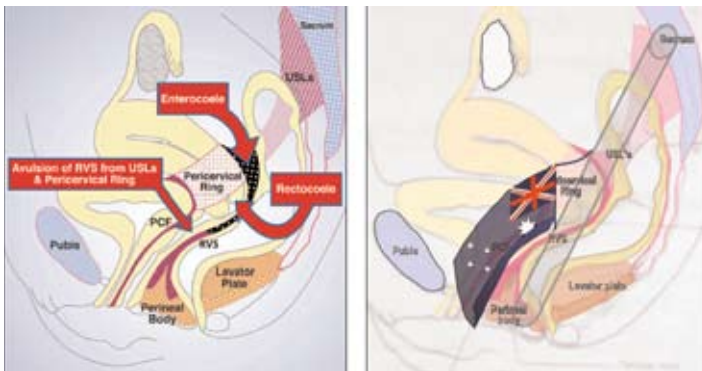
Pelvic connective tissue is not structurally suited to chronic passive load-bearing. Normal pelvic support depends on a complex interdependence of two main factors:

- Levator plate acts as a dynamic backstop, which absorbs most of Valsalva pressure wave.
- Pelvic viscera are stabilized over levator plate by an embryologic mesentery, which attaches these organs to the pelvic skeleton.

Symptomatic prolapse = failure of both components, usually from childbirth trauma.

Pelvic connective tissues are organized into two semi-independent support axes, which interact like a flag and flagpole

- Alignment of the superior and posterior supports creates the **vaginal suspensory axis** ('the flagpole'). This strong fascial leash runs from the sacral periosteum, through uterosacral ligaments and pericervical ring, down to perineal body. When intact, this vaginal suspensory axis partitions the vaginal cavity from the cul de sac and rectum, forming a membrane that guides faeces efficiently through the pelvis and out the anus.
- An anterior extension of the pubocervical fascia runs from the pericervical ring to the pubic arch, therefore forming the **bladder suspensory hammock**, (the 'flag', at half mast). When intact, this hammock provides trampolinelike support to the bladder, but is not suspensory of the vaginal apex.



Childbirth trauma tends to tear this vaginal suspensory axis in the 'plane of least dimensions', where expulsive forces increase exponentially:

- If **born** above the plane of ischial spines, the USL's are avulsed from the pericervical ring, and uterine descensus results.
- If **born** below the spines, the rectovaginal septum is avulsed from the pericervical ring, creating a defect in the posterior pelvic 'partition'. Viscera are then forced into this 'low pressure zone' as a pulsion hernia (enterocoele), a sliding hernia (sigmoidocoele) or an extraperitoneal hernia (rectocoele).

Once torn, the endopelvic connective tissues undergo a slow but relentless deterioration in collagen quality. Hence, modern hernia principles dictate that, for durable repair, an appropriate tissue augmentation material should be used.

From a biomechanical perspective, effective surgical correction requires:

- Re-attachment of the vagina onto the USL's (and hence the axial skeleton). Mesh used for this task must act as a **'suspensory strut'**, for which tensile strength is the dominant consideration.
- Repair of any rectoenterocoele by closure of the low pressure zone (shown in the figure right). Mesh used for this task must act as a **'bridging graft'**, for which tissue flexibility and a low risk of erosion or pain risk is more important than extreme tensile strength.



Polypropylene is well suited to the former objective, but relatively morbid when used as a bridging graft in proximity to motile hollow viscera. First generation biologicals with cross-linked collagen (eg, Pelvicol) are not well suited to either task, and have been shown to perform poorly in recto-enterocoele repair. For example, Altman et al (Obstet Gynecol 2006; 107: 59-65) reported a 41% failure rate at 3 years. Our **research hypothesis** was that a 'second generation' graft with tissue engineering properties, if sized and shaped appropriately, would give much better results.

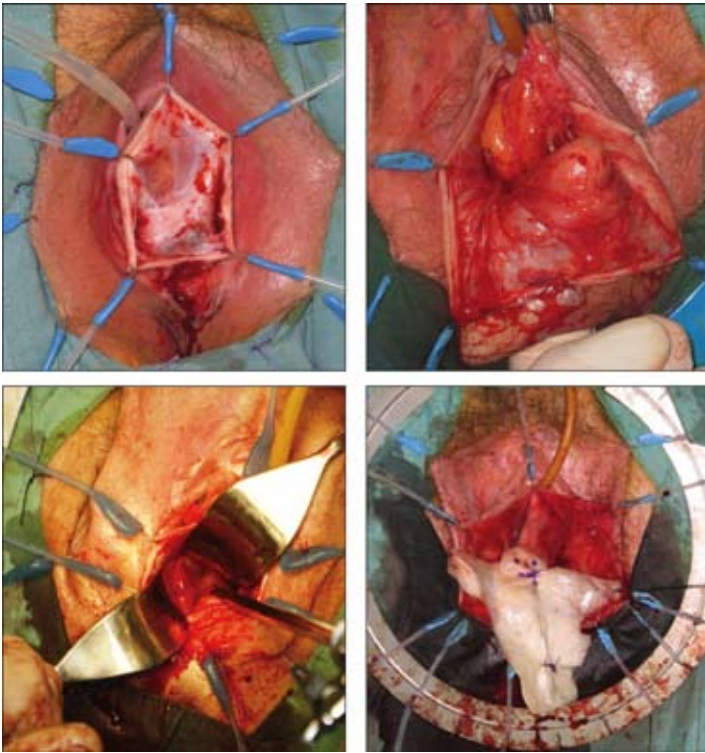
MATERIAL AND METHODS

This study presents a retrospective series of 49 consecutive women who had a SurgiSIS® bolstered 'defect-specific' recto-enterocoele repair, over a two year period (2004 - 05). Main outcome measures were:

- (i). recurrent posterior or apical segment prolapse, to objective examination;
- (ii). control of such symptoms as pelvic drag, vaginal bulge, rectal emptying difficulty and dyspareunia; and
- (iii). all significant complications.

Key points in ensuring a **safe and effective operative technique** were:

- Routine use of the Lone Star Retractor®, to optimize exposure, and to create traction / counter-traction throughout the wound.
- Pararectal spaces were entered via an essentially bloodless embryologic cleavage plane between the endopelvic and parietal fasciae, allowing easy passage to each sacrospinous ligament.
- A combined bridging and suspensory graft of SurgiSIS® biomesh was secured to the extraperitoneal portions of the uterosacral ligaments (antero-medially) and to the sacrospinous ligaments (postero-laterally). This implant was pre-shaped, somewhat like a "gingerbreadman" (with very long "arms" and a short "body") - thus suspending the vagina within the mid-pelvic axis.



RESULTS

1. 46 of 49 patients (94.9%) experienced outright or qualified anatomic and functional success at 12 months.
2. They were statistically significant reductions in all preoperative symptoms

Bulge/prolapse awareness
 Pelvic drag / backache
 Defecatory difficulties

} all *P* values <.05

Intraoperative complications were minimal, apart from two cystotomies that were immediately identified and repaired.

3. No graft-related morbidity or dyspareunia has been seen.

IMPLICATIONS

In vitro testing showed 'first generation' biomeshes to be mechanically strong, and manufacturers initially thought that cross-linking of the collagen fibres would transform these biomeshes into permanent organic implants (like tanned leather). In vivo, however, any denatured (crosslinked) collagen - whether of endogenous or exogenous origin - is seen by the host's immune system as "dead tissue", and hence subjected to a biodegradation reaction (ie, encapsulation and enzymatic autolysis). Hence there reports of unduly high repair failure rates with 'first generation' allografts or xenografts. Conversely, 'second generation' biomeshes like SurgiSIS® (a non-denatured collagen-elastin scaffold with active matrix molecules, prepared from porcine small intestinal submucosal) rapidly repopulate with host cells. During a subsequent remodeling stage, all implanted porcine collagen is resorbed and replaced by strong host connective tissue.




WORKSHOPS
 IN PELVIC SURGERY