

Pearls and Pitfalls of Mesh Surgery

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Abstracts

Objectives This article attempts to offer balanced insight into the use of transvaginal mesh for pelvic organ prolapse especially in the light of the negative publicity in recent times. The role of transvaginal mesh has been in the limelight for a number of reasons and it is important to address this issue in an objective, fair, and balanced manner. The conventional approach to prolapse surgery has undergone a paradigm shift and the principles of mesh replacement surgery sharply contrast with many traditionally held beliefs. This has created a new set of challenges that has revealed a sharp division of opinion among specialists and sub-specialists alike.

Conclusion The article is an attempt to explain how mesh surgery can be safely and efficiently performed in carefully selected cases and is based on the combined wisdom of some of the leading surgeons in the sub-specialty today.

Keywords Reconstructive pelvic floor surgery · Use of mesh · Pearls and pitfalls

Although the problem of urinary incontinence and pelvic organ prolapse has been recognized since antiquity, the first

mention in the modern era of medicine was only in the mid-nineteenth century when Marion Sims first sought to establish the relationship of urology and gynecology. The life expectancy for women has almost doubled through the 20th century. With a significant increase in the post-menopausal female population, there is a growing demand for improved quality of life and management of pelvic floor dysfunction [1]. The surgery for pelvic organ prolapse has evolved over the past 200 years and continues to be influenced by dynamically changing concepts, involving not only newer approaches to the difficult problem of recurrent pelvic organ prolapse, but also a renewed understanding of pelvic floor anatomy.

It is important that one's approach toward surgery for pelvic organ prolapse (POP) be dictated by patient symptoms. Indeed, operating on "asymptomatic" patients is best avoided because the only thing she will get post-operatively is "symptoms" [2, 3]. Assessment of prolapse needs to be done mindful of the day-to-day situations that aggravate it; for example, examining a woman after a bout of exercise. The dorsal or the lithotomy position may not reveal an enterocele, whereas a squatting or a semi-crouching position might be useful [4]. One should never hesitate to perform per rectal or bidigital examination which is not only useful in distinguishing between enteroceles and rectoceles, but also effectively evaluates damage to the perineal body. Investigation modalities like ultrasound, MRI, and defecation proctography are underutilized albeit extremely useful adjuncts in the pre-operative planning, especially for recurrent genital prolapse and often reveal

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unrecognized defects in anatomy and function [5–9]. It is desirable to employ strategies that reduce chronic pelvic floor stress like insuring weight loss, treating constipation and chronic cough [10, 11]. It is appropriate to use pre-operative vaginal estrogen and advise pelvic floor physiotherapy that ideally should continue post-operatively as well [12]. Richard Te Linde famously commented “the patient should ask the gynecologist for relief; the gynecologist should not urge the patient to have corrective surgery if she does not feel sufficiently uncomfortable to request it” [4]. Another issue that needs consideration is the under diagnosis of severity of POP that can occur in about a third of cases in outpatient assessments. About 50 % of women with vault prolapse will have occult Stress Urinary Incontinence, and thus there may well be a role for pre-operative urodynamics [13, 14]. Pre-operative assessment under anesthesia is invaluable and when the true severity of prolapse is revealed, the pelvic surgeon should have numerous choices available to correct the prolapse without compromising the consent for surgery.

Adequate pre-operative patient education and post-operative support is essential to help reduce readmission rates when performing prolapse operations in ambulatory day surgery [15, 16]. It is often forgotten that the vagina is not just a copulatory organ, but also moves dynamically during defecation and voiding. The natural tissue planes that allow for this may become stiff and less compliant when mesh is used inappropriately. Graft (mesh) augmentation or graft (mesh) replacement? There seems a clear difference appearing in the outcomes of these two separate methodologies that most studies reported dealing with graft-augmented surgery. The graft is placed superficial to the fascia in mesh-augmented surgery, whereas it is placed close to the viscus in mesh replacement surgery (A. Rane, personal communication) [17]. Always consider “His” and “Her” pareunia while planning surgery—male dyspareunia seems invariably associated with stiff graft material exposure, while female dyspareunia seems to be more associated with excessive graft tensioning or with shortening and narrowing of the vaginal canal [18–21].

More recently, there has been an unprecedented expansion in the market for mesh kits and various biotech companies are aggressively marketing these. This relatively new technology has not been yet been subject to robust randomized controlled trials or case-controlled studies [22–25]. The proliferation of different types of synthetic and biologic meshes without comprehending their individual biodynamics could lead to delayed complications [26, 27]. Every needle, every Kit is different with varying kinds of delivery devices, for example helical needles, open curve needles, self-retrieving needles, needles with inner and outer sheaths. It is imperative that the operating surgeon have detailed knowledge of the nuances

of each individual device. It is useful to have training in cadaver workshops to demonstrate the technique and anatomic safety of these mesh kits. It is important to be cognizant of the fact that needle curvatures of the devices are unique and there are directional reversals of the handles with respect to the needle tips. All these spatial relationships and maneuvers have to be envisioned within the three dimensionality of female pelvic anatomy—a factor paramount in preventing major visceral and vascular injuries [17, 28]. Patient positioning should be supervised by the surgeon—it is too awkward to change mid operation, especially when the vaginal route is being employed. Anatomy also changes with changing patient position and major complications could result if this fact is not appreciated. One needs to have the knowledge of complications that could potentially result with pelvic reconstructive surgery and importantly be capable of managing these. It is important to appreciate that results of mesh repair, be they “augmented” or “replacement” grafts, are always good in the short term and only studies with longer than a year’s follow up reveal the true picture [29, 30]. So, one should be wary of promising “too much too soon.” There is also a tendency among biotech companies to change meshes in their kits with little or no warning or information to end users.

When the use of mesh is contemplated, it follows that there should be an inherently flexible plan in place to cover for dealing with unforeseen compartmental defects. It is good practice to use hydrodissection with local anesthetic mixed with diluted epinephrine. It not only helps in developing the natural relatively avascular tissue planes in the pelvic floor, but also facilitates proper mesh placement, reduces the incidence of visceral or neurovascular damage, and is of immense benefit in carrying the dissection through the full thickness of the vagina. [17]. The tissue planes between the viscus and the lateral pelvic wall can usually be developed efficiently with a combination of blunt and sharp dissection. The latter insures that the mesh lies directly abutting the prolapsing viscus. This markedly reduces the chance of mesh erosion besides meeting the core requirement of reducing the prolapse of the affected organ, not of its enveloping fascia (M. Cosson, personal communication) [17]. In this crucial point, one sees a departure from the conventional surgical belief that has led generations of surgeons to believe that skinning the vagina clear of its fascia is essential to a good repair. This, added to the fact that no or minimal vaginal skin is excised in mesh surgery, makes the whole concept counterintuitive. The operated area often looks, as it should, visually unpleasing, as if the prolapse has not been reduced at all—this is in fact an indirect indicator of appropriate mesh tensioning [17]. Therein lies the beauty of mesh surgery—it factors in the concept of vaginal remodeling that allows

surrounding tissues to restructure in much the same way the vagina involutes to its pre-pregnancy state following vaginal birth [31].

Pivotal to the success of mesh replacement surgery is the key factor of “Anchorage.” Currently, the sacrospinous ligament lies at the heart of mesh surgery—it is relatively avascular, has a fixed anatomic location with well-circumscribed boundaries, identifiable even in obese women, and acts as a sturdy anchor. The anterior approach to the sacrospinous ligament is an art that requires some degree of relearning and is quintessential to mesh surgery [32]. It is important to address prolapse of each compartment as a separate operation chiefly because it deals with different prolapsing organs that need individually tailored solutions. It is good practice to approach each compartment through separate colpotomy incisions, irrigate tissues during repair, lay the mesh as flat as possible on the abutting viscus carefully avoiding excessive tension in the mesh limbs and rolling of mesh edges. The latter can be achieved using a couple of anchoring sutures to the underlying fascia. Additionally, a two-layered vaginal closure makes mesh erosion less likely as much as it reduces dead space preventing hematomas (A. Rane, personal communication). It is useful to think of mesh as a medication that needs to be used in the “correct dose”—so trim the mesh to meet individual requirements (L. Brubaker, personal communication). It is vital that replacement mesh surgery be performed per protocol established by the manufacturer as any deviations from the accepted technique can cause untold damage to the woman besides being medico-legally indefensible.

The apical compartment deserves special mention because it often co-exists with the more obvious anterior or posterior vaginal prolapse and more to the point is invariably under or inappropriately treated. Although it is usually addressed adequately with a McCall’s culdoplasty or a sacrospinous hitch, it may occasion a sacrocolpopexy(SCP)/hysteropexy especially in a woman with a short vagina all too often following overzealous vaginal trimming, the bane of older “A-P” repairs. Bowel dysfunction is not uncommon following a SCP and this may suggest that it is an operation that inherently involves “over correction.” The laparoscopic approach to a SCP is preferred, although it requires advanced skills that have a steep learning curve. It is preferable to use a lightweight polypropylene mesh for SCPs and important to efficiently anchor the graft to both ends, remembering these are the commonest sites for mesh “fracture” leading to recurrences [33]. The anterior compartment is most prone to mesh failures and mesh erosion, the latter usually an effect of an overtly tensioned graft. Asymptomatic rectoceles are best left alone, but it is important to address an enlarged genital hiatus through an intravaginal perineoplasty. And finally, a word about mesh erosion—it is important to remove as much of the visible mesh as possible before performing a layered closure [34].

In recent times, there has been a mushrooming of cosmetic vaginal surgery clinics promising “designer vaginas,” G Spot augmentations, “vaginal rejuvenation,” and the like. Cosmetic vaginal surgery requests should be very carefully analyzed, psychologic assessments sought if deemed necessary, and unscientific procedures avoided at all costs [35]. Every pelvic surgeon should define his or her “comfort zone” while considering a procedure for a patient. A word from the wise—do it when you believe in it and more importantly are trained for it (B. Schull, personal communication)! One should desist from succumbing to pressure from one’s peers as much as from the compelling persuasive tactics employed by the industry.

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