Clinical evidence in the use of biological materials
in female pelvic floor reconstruction

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Pelvic organ prolapse and incontinence are common pathologies affecting a substantial number of women in almost every population. It may occur in up to 50% of paraous women (1,2). Seven to 11% of women will undergo surgery for prolapse during their lifetime and approximately 30% of those will need repeat operation for recurrent prolapse (3,4). Traditional repair techniques using patients’ native tissues, have limited long-term success rates (5). In an attempt to improve prolapse surgery outcomes, several biological and synthetic materials have been used during pelvic reconstructive surgeries.

Any natural or synthetic substance that incorporates or integrates into a patient’s own is defined as a “biomaterial” (6). The biomaterials or grafts used in pelvic reconstructive surgeries are are summarized in Table 1.

Table 1. Types of materials used in pelvic organ prolapse repair (5,7,8,9).

A. Biologics:
   1- Autologous fascia: Rectus fascia, fascia lata, vaginal mucosa, skin graft
   2- Heterologous:
      i) Allogenic: Cadavaeric- Dura matter, Rectus sheath, Fascia lata, Dermis,
      ii) Xenogenic: Porcine dermis, small intestine submucosa, bovine pericardium, fetal bovine dermis.

B. Synthetics:
   1- Absorbable: Polyglycolic acid, polyglactin, polyglactin/polypropylene
   2- Non-absorbable: Polyester, polytetrafluoroethylene (PTFE), polypropylene, Polyethylene, and nylon

Development, processing and characteristics of biological grafts are beyond the scope of this review. In this review, it was aimed to discuss available evidence-based data about the efficacy and clinical use of biological grafts in pelvic organ prolapse and incontinence treatment.
**Rationale for use of biological grafts:**

Recently, it was reported that nearly half of the surgeons used minimally invasive transobturator devices for cystocele repair and nearly all use synthetic mesh in procedures either for stress incontinence and/or POP treatment (10,11). Recently, American Food and Drug Administration (FDA) has announced warnings on use of synthetic meshes for pelvic floor reconstructive surgeries. These led to a hesitancy in use of meshes and partial increase in use of other biological grafts such as allografts and xenografts. These biological grafts have gained popularity because they are thought to have less risk of erosion, provide scaffolding for host tissue growth, decreased operating time compared to native tissue harvesting, less risk of erosion than with synthetic meshes. Disadvantages of biological graft use include; early disappearance, host versus graft response, lack of uniform graft composition, and risk of prion transmission.

In the following sections, clinical results with use of biological materials in different prolapse surgeries and incontinence treatment will be discussed.

**Apical prolapse**

Abdominal sacrocolpopexy using synthetic mesh is defined as the “gold” standard treatment for apical vaginal prolapse (8,12). Success rates for this procedure range from 78 to 100% over a follow-up period of 6 months to 3 years (13). Longer term follow-up data is also available in another study and for up-to 13 years after ASC, 74% success rate was maintained (14). Laparoscopic sacrocolpopexy has also been shown to have similar short-term outcomes comparable with the abdominal approach (7). Operative outcomes with use of different mesh types are consistently high in ASC and are listed in Table 2.

**Table 2. Operative outcomes with mesh use in abdominal sacrocolpopexy.**

<table>
<thead>
<tr>
<th>Author</th>
<th>n</th>
<th>Mesh type</th>
<th>Follow-up (mo)</th>
<th>Success (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gregory et al</td>
<td>28</td>
<td>Marlex/Mersilene</td>
<td>26.3</td>
<td>89</td>
</tr>
<tr>
<td>Culligan et al</td>
<td>54</td>
<td>Polypropylene</td>
<td>12</td>
<td>91</td>
</tr>
<tr>
<td>Altman et al</td>
<td>25</td>
<td>Prolene</td>
<td>7.4</td>
<td>71</td>
</tr>
<tr>
<td>Rust et al</td>
<td>12</td>
<td>Mersilene</td>
<td>9-42</td>
<td>100</td>
</tr>
<tr>
<td>Addison et al</td>
<td>56</td>
<td>Mersilene</td>
<td>6-126</td>
<td>89</td>
</tr>
<tr>
<td>Baker et al</td>
<td>59</td>
<td>Prolene</td>
<td>1-45</td>
<td>86</td>
</tr>
<tr>
<td>Tate et al</td>
<td>29</td>
<td>Polypropylene</td>
<td>60</td>
<td>93</td>
</tr>
<tr>
<td>Granese et al</td>
<td>131</td>
<td>Polypropylene</td>
<td>43 mo</td>
<td>94.9</td>
</tr>
<tr>
<td>Fox and Stanton</td>
<td>29</td>
<td>Teflon</td>
<td>6-32</td>
<td>100</td>
</tr>
<tr>
<td>Snyder, Krantz</td>
<td>147</td>
<td>Gore-Tex</td>
<td>60</td>
<td>73</td>
</tr>
<tr>
<td>Valaitis, Stanton</td>
<td>43</td>
<td>Teflon</td>
<td>3-91</td>
<td>91</td>
</tr>
</tbody>
</table>
Considering allogenic graft material use in ASC, biological grafts did not meet several criteria to be validated in general use. First, allogenic material use showed a high short-term failure rate (15). In two prospective trials comparing treatment successes of synthetic and biological meshes for ASC, Culligan et al, reported significantly higher failure rates in women receiving solvent dehydrated fascial grafts at 6th months postoperatively compared to women receiving synthetic mesh (16). Similarly, use of synthetic mesh was also found to be superior to use of freeze-dried cadaveric fascia for ASC surgery in a retrospective cohort study. Higher success rates were obtained with mesh use (89%) when compared to allograft use (61%). Similarly, in another study comparing use of xenograft (Pelvicol) with polypropylene mesh, it was reported that the xenograft group had a higher rate of apical failures. Another well-designed retrospective study revealed similar findings of porcine dermal graft inferiority (17). Based on current literature review, sacral colpopexy using biological grafts such as porcine dermis, porcine small intestine submucosa, and cadaveric fascia lata is inferior to polypropylene mesh for anatomical support.

Literature regarding the use of allografts in sacral colpopexy is limited. In one series of 53 patients using cadaveric fascia lata, the procedure is associated with a failure of 83%. Another investigation revealed 95% cure rate at the vaginal apex at 1 year. The disparity in results might be attributed to different techniques used in colpopexy procedure. In a randomized controlled study comparing mesh and cadaveric fascia lata in abdominal sacral colpopexy, 68% of the allograft group and 91% of the synthetic mesh group were objectively cured. Success rates differ with a wide range in different studies as summarized in Table 3 (36).

<table>
<thead>
<tr>
<th>Study</th>
<th>Graft/Mesh</th>
<th>No. Patients</th>
<th>Follow-up (mo)</th>
<th>Anatomic Cure</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latini et al19</td>
<td>Autologous fascia lata (AFL)</td>
<td>10</td>
<td>31</td>
<td>100%</td>
<td>No graft-related complications</td>
</tr>
<tr>
<td>Fitzgerald et al40</td>
<td>Cadaveric fascia lata (FD/IR-CFL)</td>
<td>53</td>
<td>17</td>
<td>17%*</td>
<td>40% reoperation rate</td>
</tr>
<tr>
<td>Flynn et al41</td>
<td>Cadaveric fascia lata (FD-CFL)</td>
<td>19</td>
<td>11</td>
<td>95%†</td>
<td>5% reoperation for apical prolapse</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10% reoperation for anterior prolapse</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11% wound breakdown</td>
</tr>
<tr>
<td>Culligan et al52</td>
<td>Cadaveric fascia lata (SD/IR-CFL)</td>
<td>44 graft</td>
<td>12</td>
<td>68% graft</td>
<td>15% wound breakdown</td>
</tr>
<tr>
<td></td>
<td>Polypropylene mesh (Type I)</td>
<td>45 mesh</td>
<td></td>
<td>91% mesh</td>
<td>4% erosion</td>
</tr>
<tr>
<td>Gregory et al53</td>
<td>Cadaveric fascia lata (FD-CFL)</td>
<td>18 graft</td>
<td>21</td>
<td>61% graft</td>
<td>No erosion or wound breakdown in either</td>
</tr>
<tr>
<td></td>
<td>Mersilene mesh (type III)</td>
<td>19 mesh</td>
<td>26</td>
<td>89% mesh</td>
<td>group</td>
</tr>
<tr>
<td>Altmann et al44</td>
<td>PD (HMDI/IR-PD)</td>
<td>27 graft</td>
<td>7</td>
<td>71% graft</td>
<td>No erosion or wound breakdown in either</td>
</tr>
<tr>
<td></td>
<td>Polytetrafluoroethylene (Gore-tex)</td>
<td>25 mesh</td>
<td>7</td>
<td>76% mesh</td>
<td>group</td>
</tr>
</tbody>
</table>
Treatment of apical and vault prolapse may also be carried out by transvaginal route. Benson et al., treated 88 women by randomizing to a vaginal (bilateral sacrospinous vault suspension and paravaginal repair) or abdominal (sacrocolpopexy and paravaginal repair) surgical technique. The treatment outcome was considered as unsatisfactory in 33% of the vaginal group and 16% of the abdominal group (27). In another study comparing two techniques, optimal results were obtained in 80.3% of women in the vaginal group and 94.2% in the abdominal group (28). However, Maher et al, after 2 years of follow-up, reported equal treatment successes as 91% and 94% in vaginal and abdominal sacrocolpopexy groups, respectively (29). Considering these three trials which were considered to be similar enough to allow comparison of these two techniques revealed that ASC was better than vaginal treatment in terms of: a lower rate of recurrent vault prolapse, less postoperative dyspareunia, less postoperative stress incontinence, lower reoperation rate for prolapse (27-29).

Posterior intravaginal sling (PIVS) or intravaginal slingplasties using synthetic mesh are other alternatives for the treatment of apical vault prolapse (8). Petros first described this technique as a less invasive method and reported a success rate of 94% in 71 patients with 5.6% complication rate (30). Literature consists of several studies with intravaginal slingoplasties that have used nylon, polypropylene, polyglactin/prolene and prolene meshes and success ranged between 71%-100% (8). In another study, 118 consecutive women underwent PIVS operation for Pelvic Organ Prolapse Quantification stage 3 or 4 vaginal cuff prolapse. At a mean follow-up of 58.6 months, the success rate of PIVS was 96.6% (31).

In summary, there’s enough support in literature for the use of polypropylene mesh in treatment of apical prolapse. Similarly, National Institute of Health and Clinical Excellence recommends polypropylene mesh use in ASC surgery as a safe and efficacious method of vaginal vault prolapse repair (35). For sacral colpopexy using polypropylene graft, mesh erosion or extrusion rates were reported to be around 2% as suggested by IUGA/ICS (5,32). Thus, the rationale to use biological grafts in abdominal sacrocolpopexy has not been met. However, the reason for not using biologicals is not because of their low success rate, but rather due to high success rate maintained by a much cheaper material, polypropylene mesh, without having increased complication rates in long-term.
Biological graft use in Urinary Incontinence treatment

Autologous slings

Currently, the most widely used technique and graft in treatment of stress urinary incontinence (SUI) is midurethral slings and synthetic mesh, respectively. Tension-free vaginal tape (TVT) procedure in the late 1990s greatly reduced the use of Burch and other suspension procedures. Similarly, pubovaginal sling (PVS) using autologous or allograft materials has also been used less frequently in anti-incontinence surgeries but continuing success and special indications for this procedure make this technique a valuable alternative.

Despite harvesting patients own tissue and having an incision, autologous fascia lata use in SUI has excellent results in all types of stress incontinence. The commonly used materials here are rectus fascia and tensor fascia lata. Chaikin and colleagues published a cured/improved success rate of 92% at a median 3 years follow-up for 251 patients by autologous sling (78). A subsequent series by Flisser and Blaivas of 74 women undergoing urethral reconstruction included 56 who had a concomitant autologous fascia (AF)-PVS; 87% were cured/improved in terms of SUI (79). Morgan and et al. published a series of 247 women who received an AF-PVS; their self-reported continence rate was 88% at a mean follow-up of 4 years (80). Similarly, Petrou and Frank reported a 50% cure rate in 14 patients who had a repeat AF-PVS after failing their initial PVS (81). Migliari and colleagues reported an SUI cure rate of 80% in 32 women treated with AF-PVS performed at the time of urethral diverticulum repair (82). Complications associated with the AF-PVS are symptomatic urgency ranging from 7% to 20%, and the need for postoperative intermittent catheterization at 1 month varies from 6% to 47% (83).

Allografts and Xenografts

In the last decade, in an attempt to minimize the invasiveness of the procedure and to limit harvest-site morbidity, allogenic grafts for pubovaginal slings have also been selected. Allograft tissue such as cadaveric human fascia lata, dura or even dermis has been used. As discussed the use of non-autologous materials is popular and attractive because it decreases operative time and avoids the possible morbidity associated with a second surgical site. One early series of 16 women undergoing sling surgery using allogeneic human cadaver fascia lata showed acceptable short-term results. (84) An objective success rate of 79% at follow-up ranging from 6 to 12 months was reported.
In a study comparing use of porcine dermis, AF sling and synthetic mesh, it has been suggested that the most durable success was obtained by AF and synthetic mesh use. 'Success' rates for TVT, AFS and Pelvicol were 73%, 75.4% and 58%, respectively. Comparing the 1- and 10-year 'success' rates, there was deterioration from 93% to 73% (P < 0.05) in the TVT arm and 90% to 75.4% (P < 0.05) in the AF-PVS arm. Overall, the 'dry' rates favoured AF-PVS when compared with Pelvicol (P < 0.001) and TVT (P = 0.036). The re-operation rate for persistent SUI was 3.2% (two patients) in the TVT arm, 13.1% (five) in the Pelvicol arm, while none of the patients in the AF-PVS arm required further intervention (85).

Processed porcine small intestine submucosa (SIS) has also been used for incontinence treatment. Early studies of 152 patients who underwent sling surgery using an SIS sling anchored to the pubis with bone screws, showed that 142 women (93.4%) were relieved of their SUI after a median follow-up of 2.3 years. There were no cases of sling infection, erosion, or rejection during the four-year follow-up of this series (86). In another study, 48 women underwent pubovaginal sling with SIS. At median follow-up of 76 months 33/48 (69%) were cured, 6/48 (12%) were improved while 9/48 (19%) were failed or unchanged. No urinary retention or dyspareunia was reported and no vaginal erosion or adverse tissue reaction was detected (87).

Solvent-dehydrated cadaveric dermis is another allograft that has been used in pubovaginal sling surgery. Onur and Singla reported their short-term experience with this material and treated 25 women with SUI. At a mean followup of 12 months, 80% of women were cured (no pads or using 1 pad occasionally) and the procedure was accepted as successful (88).

In attempt to assess the efficacy and patient satisfaction utilizing Duraderm allograft as sling in twenty five women, 17/25 (68%) were dry, 6 (24%) improved, and 2 (8%) failed. However, it was observed that at mean intermediate follow-up of 14.8 months the dry rate was 32%. Overall 76% were satisfied with the surgical outcome, 17 (68%) noted they would have surgery again, and 17 (68%) would recommend the procedure. (89).

**Biological graft use in Anterior compartment**

Allograft and Xenograft use in anterior repairs:

In an attempt to decrease the complication rates and particularly erosions of mesh use in anterior compartment repair, biological grafts were introduced. Salomon et al., reported anterior prolapse repair using porcine dermal implant through the transobturator route.
Anatomical cure was present in 81% of women whereas 19% had recurrence or persistence (46). In a retrospective review, Gomelsky et al, 70 women underwent surgical repair of high grade cystocele with porcine dermis interposition grafts. The graft was secured to arcus tendinous fascia pelvis (ATFP). More than 90% of patients had no failure at a mean follow-up of 24 months (47). Using same graft for the correction of advanced anterior vaginal prolapse, a 4 x 12 cm segment was secured bilaterally to the ATFP. At 2 years followup, an overall cure rate of 78% was reported (48). Systematic review and meta-analysis for using mesh or grafts in the treatment of anterior compartment prolapse revealed the evidence that there was a trend in the crude objective failure rates with procedures not using mesh/graft having the highest failure rate, followed by procedures with absorbable synthetic mesh, biological graft, and non-absorbable synthetic mesh with decreasing order (45). However, Cervigni et al., compared Prolene Soft with Porcine Dermis with a mean follow-up of 8 months in anterior repair. The objective failure rates were found to be similar between groups (49).

Cadaveric fascia lata with or without pubovaginal sling has been utilized to correct anterior prolapse with a success rate varying from 81 to 100%. Similarly, success rates in comparison of anterior colporraphy and anterior repair augmented by fascia lata revealed 71% and 82%, respectively. However, in another study use of porcine dermis for anterior repair did not reach the success of polypropylene mesh. The success rate at 1 year was 64% with allograft and 96% with polypropylene mesh. On the contrary, anterior colporraphy with porcine dermis graft overlay showed superior efficacy (93%) compared to anterior colporraphy alone (81%). Considering the efficacy of cadaveric tissues in anterior prolapse repair, Ghandi et al, found decreased recurrence rates with the use of cadaveric fascia lata versus standard repair (51). Kobashi et al., used cadaveric fascia lata secured by anchors attached to the pubic bone vaginally, and sutured laterally and posteriorly to the vault for treatment of primary cystocele. No failures or complications were observed at a short follow-up (52). In another study, Frederick et al., examined 251 patients and at a short follow-up (6 months), cadaveric sling us efor anterior prolapse showed 93% cure (53). However, Clemons et al, had only 59% success rate by using AlloDerm graft for anterior compartment treatment (54).

Considering the comparative studies on the use of biological graft use in the anterior compartment and anterior colporraphy, a total of 4 RCT were available and two of these studies favored use of biological grafts for better results whereas, other 2 retrospective studies demonstrated no difference in outcomes (55). In patients receiving SIS for anterior
colporraphy the objective failure rate was detected in 14% of patients whereas anterior repair alone yielded 33% failure rate (90). Thus, there’s no sufficient data to conclude whether biological grafts offer advantages or disadvantages in anterior prolapse repair compared with traditional repair without graft.

A review of use of biological grafts and success rates in anterior compartment prolapsed is shown in Table 5.

<table>
<thead>
<tr>
<th>Author</th>
<th>n</th>
<th>Mesh type</th>
<th>Follow-up (yrs)</th>
<th>Success (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaikin et al (56)</td>
<td>17</td>
<td>Cadaveric fascia</td>
<td>0.6</td>
<td>100</td>
</tr>
<tr>
<td>Groutz et al (57)</td>
<td>21</td>
<td>Cadaveric fascia lata</td>
<td>1.7</td>
<td>100</td>
</tr>
<tr>
<td>Gandhi et al (51)</td>
<td>-</td>
<td>Cadaveric fascia</td>
<td>1.1</td>
<td>79</td>
</tr>
<tr>
<td>Chung et al (58)</td>
<td>-</td>
<td>Cadaveric dermis</td>
<td>2</td>
<td>84</td>
</tr>
<tr>
<td>Weber et al (38)</td>
<td>56</td>
<td>Polyglactin 910</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>De Tayrac et al. (59)</td>
<td>84</td>
<td>Polypropylene</td>
<td>2</td>
<td>91.6</td>
</tr>
<tr>
<td>Migliari et al. (60)</td>
<td>15</td>
<td>Polypropylene</td>
<td>1.3</td>
<td>75</td>
</tr>
</tbody>
</table>

There’s currently mixed evidence to support graft use in every case with anterior compartment prolapse. Although graft reinforced anterior prolapse repair in recurrent cases were shown to have higher success rates in women whom no graft was used, there’s still controversy in literature and further large prospective studies are required. Major concern after prolapse surgery is development of complications such as; mesh extrusion, dyspareunia, de novo urgency. Several retrospective or case studies showed excellent results whereas, serious complications were reported in other series. The 2012 Cochrane meta-analysis concluded that objective success rate is higher in patients receiving anterior colporraphy reinforced with biological grafts compared to anterior colporraphy alone (91).

Conclusions for biological graft use in anterior compartment:
- Biological grafts in meta-analysis have improved anatomical outcomes compared to native tissue repairs.
- Level 1 evidence support a superior outcome with polypropylene mesh compared with Pelvicol in the anterior compartment. Mesh exposure found to be significantly higher.
Proposed benefits include less risk of erosion for biological grafts, decreased operating time with kits, decreased operating time if autologous tissue not harvested.

Disadvantages of biological in anterior compartment include host versus graft response, risk of infectious transmission.

Conflicting outcomes were reported regarding the addition of a biological graft for cystocele repair, with considerable variation in graft material and surgical technique.

Use of biological graft in Posterior compartment

The success rates with traditional posterior repairs range between 76% to 96% (5,35). Thus, it’s questionable for further search for a new technique or graft use for posterior prolapse repair. There are no large series and randomized studies comparing graft versus no graft (61). Moreover, synthetic meshes are used less frequently, whereas absorbable meshes were not shown to have better results than traditional repair (35).

In a retrospective study, Lim et al., used polyglactin/polypropylene mesh and after 6 months of follow-up, there was a cure rate of 83.9%. The erosion rate was 12.9% in this group. Postoperative constipation was present in 18%, difficulty with defecation occurred in 20.5% and de novo dyspareunia was detected in 3.4% (62). Sand et al., randomly assigned women to receive mesh or no mesh for posterior prolapse repair. No significant improvement was detected between two groups (mesh: 91.2% vs no mesh: 90%) (37). Milani used prolene mesh both for anterior and posterior repairs and reported 6.5% erosion rate and 63% increase in dyspareunia (63).

Recently, biological materials have been introduced for posterior repairs to avoid synthetic mesh complications. In a review by Kohli and Miklos, 30 women underwent posterior repair with placement of cadaveric dermal graft and for an average of 12.9 months, 7% of patients showed failure (64). However, Altman et al., using collagen mesh had less satisfactory results. At 12 months of follow-up, 38% of patients had recurrent rectoceles (65). In a comparative study between posterior colporraphy, site-specific rectocele repair, or site-specific repair reinforced by porcine small intestinal submucosa graft, Paraïso et al., reported 86% of patients in first group and 78% of patients in site-specific repair group had anatomic cure. However, women who received graft for repair had 54% success rate (66). In another
trial which compared posterior repair with or without polyglactin mesh (Vicryl), posterior compartment prolapse recurrence was equal in both groups (37).

In conclusion, currently it’s not possible to make a definitive recommendation for routine use of meshes or biological grafts in posterior compartment and native tissue even remains appropriate or same efficacy in posterior vaginal wall repair when compared to absorbable grafts (55). Moreover, there’s still reluctance among many surgeons to put prosthetic material in posterior compartment because of the risk of erosion and coital dysfunction (7).

**Use of biological materials in failed mesh slings**

Treatment of patients with a failed prior surgical procedure for stress urinary incontinence represent a challenging clinical practice. The selection of surgical technique to achieve continence may vary and ranges from endoscopic bulking agents to re-do midurethral synthetic sling procedures, autologous fascial slings, adjustable devices using meshes or balloons and repeat colposuspension procedures. However, a recent Cochrane review documented that there were no prospective, randomized clinical trials available to guide the treatment choice among these techniques (91). To best of our knowledge, there is currently comparative report about the use of allografts or xenografts in management of recurrent SUI after prior synthetic slings.

There are several reports on use of autologous fascia pubovaginal sling (AF-PVS) after prior synthetic anti-incontinence procedures for recurrent incontinence. In a cohort consisted of 288 patients, 59 women who had prior midurethral sling (MUS) and failed, were evaluated for a salvage procedure to treat the recurrent incontinence. Autologous fascial (AF)-PVS was performed in these patients and with a median of 14 months follow-up, AF-PVS treatment was found to be equally successful in patients both with or without prior MUS. It was concluded that AF-PVS after failed MUS is an acceptable treatment option (92). Similarly, Milose et al., examined the success of AF-PVS after failed MUS. A total of 66 women underwent an AF-PVS and many patients (31.8%) required mesh removal before autologous tissue placement. SUI was present in 24 % of the patients whereas, majority (76%) had mixed incontinence in this cohort. Of the patients 27% had less than 50% improvement after AF-PVS placement and they were considered to be failed again. However, 62.5 % of patients with pure SUI were totally dry and cured. Of the 50 patients with mixed incontinence only 30% were cured of incontinence. This was significantly different when compared with
patients with pure SUI. Overall, AF-PVS improved incontinence in 70% of patients and complete cure was achieved in 38% of patients with SUI and urgency incontinence. On multivariate analysis only a preoperative diagnosis of pure SUI predicted cure of all incontinence (93).

Welk and Herschorn examined the use of AF-PVS in complicated SUI treatment. 33 women with history of urethral diverticulectomy, urethral, bladder and vaginal mesh removal, pelvic fracture and obstetrical trauma history underwent PVS for their recurrent SUI. A median of 2 previous procedures to treat SUI had been attempted in these patients and 2 patients received AF-PVS as their first anti-incontinence procedure. After a median follow-up of 16 months, median pad use decreased from preoperative pad use of 5 to 1 pad per day and overall physician assessed outcome at last clinic visit was found to be 64%. The self reported urgency rate was 33% in this group and any CIC use was observed in 17% of patients but no persistent retention was developed. In conclusion, AF-PVS was suggested to be used as a salvage procedure attempting to restore continence in patients with a history of prior failed treatment (83).

In conclusion, patients with a hypermobile urethra, without evidence of intrinsic sphincter deficiency, may be managed with a retropubic urethropexy (e.g., Burch procedure) or a sling procedure (e.g., mid-urethral sling, pubovaginal sling). (LOE:II - 2B). Patients with evidence of intrinsic sphincter deficiency may be managed with a sling procedure (e.g., mid-urethral sling, pubovaginal sling). (LOE:II - 3B). In cases of surgical treatment of intrinsic sphincter deficiency, AF-PVS or retropubic tension-free vaginal tape should be considered rather than transobturator tape. (LOE: I - B). The author's choice is to continue with a MUS if the urethra is still hypermobile after a failed MUS but if not, chooses an AF-PVS in all types of incontinence.

Conclusions

Although there seems to be an increasing tendency to use of grafts in pelvic floor reconstructive surgeries, currently few studies show sufficient level of evidence. Improvement in mesh characteristics, better commercial kits may further increase their use, however long-term, randomized controlled studies are still lacking. Currently, there’s mixed data to support the routine use of biological grafts in pelvic organ prolapse treatment.
Synthetic grafts have been used for a long time for abdominal sacrocolpopexy and shown to have better results compared to biological grafts. The procedure is accepted as gold standard but may be associated with short term morbidity and potential foreign body problems.

After repetitive notifications of FDA about mesh use in pelvic floor surgeries, there's increasing use of biological grafts in reconstructive surgeries. Currently, use of cadaveric or xenograft use in anti-incontinence procedures is not gained too much popularity since use of synthetic MUS has shown long term durability with less morbidity. However, there's conflicting evidence for use of biological grafts in anterior prolapsed repairs. Biological grafts can be suggested in patients with failed prior surgery, to patients not willing to receive synthetic material or in case of re-inforcement of pelvic floor.

There’s limited data evaluating the role of mesh augmentation for posterior compartment prolapse repair. In many of the studies, the use of biological grafts in posterior wall repairs did not reveal better results than native tissue repair. Similarly, use of synthetic meshes did not receive enough attention because of fear of infection/erosion. There’s also limited long-term data for use of biological or synthetic grafts for posterior prolapse repair.

Treatment of patients with a failed prior surgical procedure for stress urinary incontinence represent a challenging clinical practice. The selection of surgical technique to achieve continence may vary and ranges from endoscopic bulking agents to re-do midurethral synthetic sling procedures, autologous fascial slings, adjustable devices using meshes or balloons and repeat colposuspension procedures. However, among these alternatives only use AF-PVS has shown long term durability and success rates after failed mesh surgery for SUI.

References.