Pubovaginal Sling

Materials and Methods in Pubovaginal Sling

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1. Historical Background

Von Giordano³가 1907 sling

, 1910 Goebell³ pyramidalis (periurethral fascia)
 , 1933 Price⁴ fascia lata
 strip sling . 1944 가 cadaveric fascia lata
 Aldridge⁵가 가 .
 sling . Williams
 Te Linde⁶ 1961 mersilene
 mesh sling . 1962 가 .
 Narik Palmrich⁷ external oblique aponeu- Kaplan¹⁴ 94%
 rosis , 1969 Low⁸ fascia lata , valsalva leak point
 Aldridge . pressure 36cmH₂O , inclusion cyst
 Pelosi⁹ 1976 dermal graft sling . Su¹⁵ ,
 . 34.8% 60.9%, 3 inclusion cyst
 McGuire and Lytton¹⁰ 1978 .
 가 가 Goldman¹⁶ Valsalva leak point pressure
 sling Aldridge 가 50cmH₂O 93%,
 . 가 50cmH₂O 40%
 Aldridge Valsalva leak point pressure
 , . Golomb¹⁷
 가 . sling 96.9%, vaginal wall sling 81.8%
 Raz¹¹ 1989 sling
 vaginal wall sling , 1996 .
 Ulmsten¹² TVT , Handa¹³
 allograft fascia lata sling
 가 .
 2. Sling
 sling , , 가,
 , , 가 .
 . 92-95%
 . 18-20
 가. (Organic)
 a. Vaginal wall sling
 vaginal wall sling sling
 가 , 가 가
 . ,
 inclusion cyst가 가
 vaginal wall sling 가
 (endopelvic fascia),

rectus fascia fascia , allogenic dura
lata , Creutzfeldt-Jakob
fascia lata rectus fascia 4 . B C virus
strip 가 ,
sling
가
가 가 .²¹
solvent , gamma
Tutoplast (Mentor HIV, Creutzfeldt-Jakob , B C
Corporation, Santa Barbara, CA),
Faslata (Bard Corporation, 가
Covington, Ga)가 .
 , ,
가 , 가 (maturation) (remodeling)가
 , Horstman ²⁷
가
allograft American
Association of Tissue Banks (scarification)
가
Solvent
 , 70% isopropyl alcohol
 , solvent . Elliott
 , , , Boone²³ solvent
25kGy 96%(25/26)
virus , Huang ³⁰
가 3-6 27.8%
sling Leach ²⁹
48 83%
sling , Flynn ²⁶ 가
collagen 71%, 77%,
solvent 87%, 90% 가
^{22, 23, 26, 27}
allograft
가 . Choe ²⁸ 가
cadaveric fascia lata acellular . Carbone ³¹ fascia lata bone
cadaveric dermis DNA anchor 37.6%가
allogenic
bone 4 HIV Fitzgerald ²⁴ 35

[illegible]

Table 1. Artificial materials used for suburethral slings(Textbook of Female Urology and Urogynaecology)

Trade name	Composition
Mersilene	Polyethylene terephthalate
Marlex, Prolene	Polypropylene
Teflon	Polytetrafluoroethylene (PTFE)
Gore-tex	Expanded PTFE
Silastic	Silicone rubber reinforced with polyethylene terephthalate
Vicryl	Polyglactin mesh

(pore size) ,
1-5µm PTFE sheet (Gore-Tex), PTFE mesh (Teflon)가 .
1µm
10-15µm
30- 60µm multifilament polypropylene mesh (Surgipro)가 .
(fibrocyte) (histiocyte)
가 .
75µm monofilament polypropylene mesh(Marlex), double filament polypropylene mesh (Prolene), multifilament Polyethylene terephthalate mesh(Mersilene) .

36 .
sling
77% 90% .
a. Mersilene
mersilene mesh multifilament Polyethylene terephthalate .
Lee 37
96% ,
Young 38 94%
, cotton swab 가

33% .
sling 가
3.5%, 8.8%,
4%

b. Polypropylene
monofilament polypropylene mesh(marlex),
double filament polypropylene mesh(prolene) Morgan
39 85.2%
, Kuo 40
96%, sling
1 .

c. Polytetrafluoroethylene
gause mesh
mesh
가
,
가 .
polytetrafluoroethylene(PTFE) 가
가

22-23% .
Choe 41
polytetrafluoroethylene MycroMesh
95% .

d. Silastic
silastic
Stanton 42
20% .

3. Sling

sling
2x14cm full strip sling(FSS), 2
x 4cm patch suture sling(PSS)
long
strip(2x14cm), medium ribbon(2.5x7cm),
short patch(2x4cm)
sling 가
(4mm), (3mm), (4mm),
1mm,
polytetrafluoroethylene, polypropylene
mesh 1mm 가 .⁴³

4. Sling

Choe⁴¹ Instron tensinometer
sling (tensile strength)
FSS가 PSS 가
FSS fascia lata 가
가 , Alloderm, Gore-Tex,
prolene mesh, dermis
rectus fascia, vaginal wall
PSS FSS
가 , PSS
fascia lata, Alloderm, Gore-Tex,
prolene mesh, dermis
rectus fascia, vaginal wall
^{43,44}

Lemer⁴⁵ rectus fascia,
dermal graft solvent-dehydrated
fascia lata, freeze-dried fascia lata
freeze-dried fascia lata
가

5. Sling

가 FSS long DeBakey
clamp
SPARC(suprapubic approach and the ARC
needles) system ,
TVT(tension free vaginal
tape) IVS(intravaginal slingplasty)
(trocar) sling
가 PSS
stamey ,
double-pronged ligature carrier
⁴⁶⁻⁴⁹

6. Sling

1 vicryl 1 prolene
1 vicryl 가
sling 가 1
prolene
PSS 가
standard, folded, suture
reinforced, cross-folded ,
cross folded standard 5.5
⁴⁵
sling
가 ,
sling
가 ,
가 ,
가 13% ,
가 ,

Table 2. Displacement and maximum load of full strip slings(FSS) and patch suture slings(PSS) by Instron tensinometer(Choe JM et al)

	Displacement (mm)	Maximum Load (N)
FSS (n=70)		
Fascia lata (n=10)	1.36 ± 0.78	217 ± 66
Alloderm (n=10)	3.12 ± 1.89	144 ± 44
Gore-Tex (n=10)	57.0 ± 12.5	136 ± 17
Prolene mesh (n=10)	28.3 ± 1.45	134 ± 5
Dermis (n=10)	8.83 ± 5.68	122 ± 64
Rectus fascia (n=10)	5.87 ± 3.8	42 ± 50*
Vaginal wall (n=10)	6.25 ± 3.97	42 ± 28*
PSS (n=70)		
Fascia lata (n=10)	31.5 ± 3.49	58 ± 22
Alloderm (n=10)	27.8 ± 1.46	68 ± 10
Gore-tex (n=10)	51.8 ± 13.9	76 ± 10
Prolene mesh (n=10)	67.8 ± 3.09	63 ± 15
Dermis (n=10)	48.9 ± 22.4	75 ± 6
Rectus fascia (n=10)	30.7 ± 12.0	38 ± 21*
Vaginal wall (n=10)	15.5 ± 9.29	21 ± 18*

Table 3. Tissue Strength Analysis of Autologous and Cadaveric Allografts (Mean±SD) (Lemer ML et al)

Sling Materials	Maximum load (N)	Maximum load graft width (N/mm)	Stiffness (N/mm)
Autologous rectus fascia	332±17	33.2±1.7	113.0±21.3
Solvent-dehydrated fascia lata	319±34	31.9±3.4	114.5±11.8
Freeze-dried fascia lata	250±29 *	25.0±2.9 *	89.2±9.5 *
Dermal graft	319±18	31.9±1.8	118.3±6.0

p<0.05, freeze-dried vs. autologous, solvent-dehydrated, and dermal graft.

Table 4. Tensile Strength of four suture to Fascia Configurations (n=6, *, p<0.05) (Sutaria et al)

Configuration	Thickness (in)	Max. Load (lb)	Thickness Adj. Max. Load (lb)
Standard	0.25±0.03	4.7±0.8 *	24.2±5.5 *
Folded	0.21±0.06	8.9±4.2 *	51.1±13.5 *
Suture reinforced	0.16±0.01	12.4±1.6 *	98.3±10.9 *
Cross-folded	0.17±0.01	17.3±1.3 *	132.7±10.3 *

가 , sling
(anchor)
Burch
가 , TVT
(Cooper's ligament)

44,45,50 vaginal wall sling 가
, , 가 ,
7. sling 가 가
sling sling 가 sling
, . McGuire¹⁰ sling
, 가
40 가 sling (scarification)
,
24,29,30
Chaikin Blaivas⁵⁵ PSS
가 가 PSS
(pull through) 가
PSS 3 , 3-6
가
Lytton¹⁰ . McGuire
, Yamada⁵¹
Blaivas¹⁸ sling 가
PSS 가
sling suture space 가 Sutaria Staskin⁵⁰
PSS
52 PSS가
sling cross folded
sling 가
, Q-tip 3-6 2-3
53,54 sling
sling sling
가 LUTS
8. Sling
sling 70%

LUTS

polyester(Protegen)

11-71%

Table 5. Artificial suburethral slings; reported postoperative complication rates (%) (Textbook of Female Urology and Urogynaecology)

Complication	Mersilene	Marlex	Standard Gore-tex	Patch Gore-tex	Silastic
Fistula	1.9-3.3	0-5	not-reported	not-reported	1.9-3.3
Sinus tract formation	0-3.3	0-2.9	2.2-17.7	0-7.6	3-3.7
Vaginal erosion	1.8-2.8	6.2-7.2	11.1-16.1	2.6-4.0	0-9.3
Urethral erosion	not-reported	1.5-5.8	not-reported	not-reported	0-1.9
Voiding dysfunction	2.7-15.9	2.3-21.7	4.4-7.7	4.9	9.3-23.9
Persistent DI	4.2-23	16.7	48-77	49-75	61.5-100
De-novo DI	not-reported	7.3	11-33	32-66	3.7-6.7
Sling revision/ removal	1.8-15.9	2.9-11.5	15.4-35.5	2.6-9	13.3-31.5

56

polypropylene mesh 0-3%

9. Sling

sling

10-40%

가

가

57-60

5%

sling

100

가

가

Dr. Ulmsten

TVT

sling

가

sling

가

, sling

가

TVT

prolene

가 가

가

, sling

가

. Choe 41

Silastic,

polytetrafluoroethylene(Gore-Tex),

, sling

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