

여성 요실금의 진단 및 치료

Diagnosis and Treatment of Urinary Incontinence in Women

571 126 - 1

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Abstract

Urinary incontinence (UI) is a prevalent condition that can adversely affect a woman's quality of life. The prevalence of UI among Korean women was estimated up to 42% of the married female population. Overactive bladder syndrome (OAB) is a symptomatic diagnosis based on the presence of urgency, with or without urge incontinence, and usually accompanied by frequency and nocturia, in the absence of obvious pathologic or metabolic disease. Stress urinary incontinence (SUI), the complaint of involuntary loss of urine during effort or exertion or during sneezing or coughing, is the most common type of UI among women. Recommended initial evaluation methods of UI include validated symptom - questionnaire, 24 hour - voiding diary, 1 - hour pad test, and provocative stress test. The initial management of OAB requires an integrated approach using behavioral and pharmacologic methods. Patients should be educated about the functioning of the lower urinary tract system, fluid and dietary management, timed or prophylactic voiding and bladder training regimens, and pelvic floor exercises (PFE). Although muscarinic receptor antagonists have been shown to be effective for the treatment of OAB, adverse effects, such as dry mouth, constipation, and blurred vision have limited their usefulness. Most cases of OAB are not cured, but the symptoms are reduced, with an associated improvement in the patients' quality of life. Patients who are not benefited by behavioral and pharmacologic intervention may respond to intravesical administration of drugs, including blockers of afferent input; intradetrusor injection of botulinum toxin, neuromodulation, and augmentation cystoplasty. The initial treatment of SUI includes behavioral changes and PFE. Bladder training, vaginal devices, and urethral inserts may also reduce stress incontinence. Surgical procedures are more likely to cure SUI than nonsurgical procedures. Based on a line of evidences available at this time, colposuspension (such as Burch) and pubovaginal sling (including the newer midurethral synthetic slings such as TVT) are the most effective surgical treatments.

Keywords : Urinary incontinence; OAB; Pelvic floor exercise; Bladder training; Antimuscarinic drug; TVT

; ; ; ; TVT

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(1).

가		2.																		
	가	<table><tr><th>Loss of Urethral Compression</th><th>Loss of Urethral Support</th></tr><tr><td>Neurologic</td><td>Levator(hammock) weakness</td></tr><tr><td>Anterior spinal artery syndrome</td><td>Childbirth</td></tr><tr><td>Radical pelvic surgery</td><td>Trauma</td></tr><tr><td>Myelodysplasia</td><td>Pelvic surgery</td></tr><tr><td>Hypoestrogenic states</td><td>Hypoestrogenic states</td></tr><tr><td>Aging</td><td>Aging</td></tr><tr><td>Anatomic</td><td></td></tr><tr><td>Scarring post urethral surgery</td><td></td></tr></table>	Loss of Urethral Compression	Loss of Urethral Support	Neurologic	Levator(hammock) weakness	Anterior spinal artery syndrome	Childbirth	Radical pelvic surgery	Trauma	Myelodysplasia	Pelvic surgery	Hypoestrogenic states	Hypoestrogenic states	Aging	Aging	Anatomic		Scarring post urethral surgery	
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Anatomic																				
Scarring post urethral surgery																				

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6)

2)

(, , , ,)

가

가

가 30 °
(urethral hypermobility)

4.

가

가

가 30 °
(urethral hypermobility)

2.

1)

가 24

1

3.

1)

2) 1

1

500ml 가

15

15

가

30

(detrusor overactivity)

200ml

(valsalva leak point

3)

(Provocative Stress Test)

pressure)

ISD

(val-

salva leak point pressure) 60cmH2O
 (maximal urethral closure pressure)
 20cmH2O .

5.

(timed bladder emptying)

(13).

, ,
 ,
 , ,
 ,
 .

Dimethyl sulfoxide(DMSO)
 polysynaptic inhibitors

2)

(cystography)

가

(neuromodulation)

, ,
 가
 가 ISD가

Interruption of innervation
 central(subarachnoid block)
 sacral rhizotomy, selective sacral rhizotomy
 perivesical (peripheral bladder denervation)

(Augmentation cystoplasty)

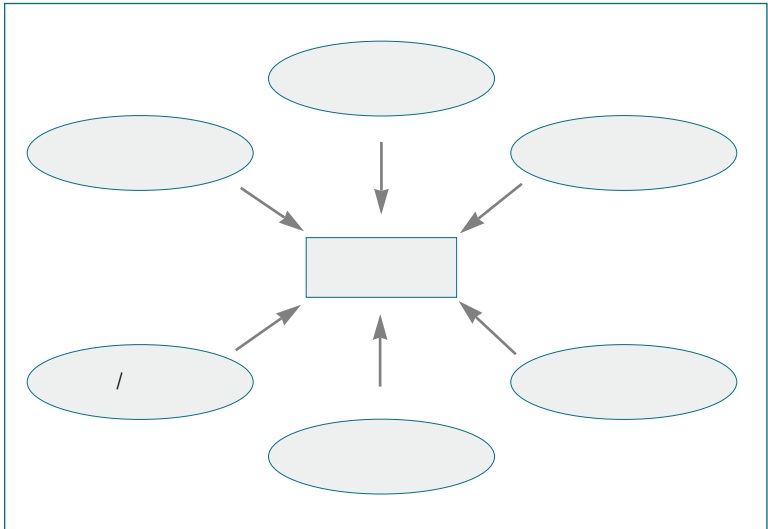
ISD가 가
 가

(beaking sign) . ()

(videourodynamics) .
 가 가 .

가

(, ,)



1.

가

(17).

2.

가

(18).

가

(19).

(5)(14).

5

1.

M3

(18).

M3

가

가 .

(warning time)

(19).

2~4

15 가 . 가 6 가

57%, 18%

(20). Tolterodine

54% (15).

		6. /
tolterodine	. Oxybutynin	Anticholinergic agents
		Dose (adults)
가 (21).		Hyoscyamine sulfate
		Hyoscyamine sulfate
Propiverine	가	Propantheline bromide
		7.5~30 mg 3~4x/day
가		Tolterodine (Detrusitol)
		1~2 mg 2x/day
20 ~ 40mg	I .	Antispasmodics(variable amounts of anticholinergic properties)
		Oxybutynin chloride (Ditropan)
	가	Oxybutynin chloride extended release
		2.5~5 mg 3x/day
		Dicyclomine hydrochloride
		5~10 mg 1x/day
		Propiverine hydrochloride (BUP - 4)
		10~20 mg 3x/day
		20~40 mg 1x/day

3. 가 . 가
가 (7)

. , , .
20%, ,
50 ~ 60% (22). , ,
, , .

. 가 . (ATP)
(extracorporeal magnetic stimula-
tion) 가 .
(23) 26 가
65% 가 (24).
가 (8).

6 .
1.
oxybutinin
tolterodine
50 ~ 80% 80 ~ 85% 40 ~ 50%
20 ~ 50% 가

7.

Nonpharmacologic
Lack of simultaneous behavioral modification
fluid intake
irritants (eg, caffeine)
Imagined failure
Incorrect diagnosis
Acute problems (eg, infection)
Pharmacologic reasons for antimuscarinic failure
Side effects prohibiting adequate dosing
Inadequate dose titration
Atropine - resistant (NANC) contraction
Non - M3 - mediated contraction (for very selective M3 blockers)
Upregulation of M3 (or M2) receptors
Myogenic (vs neurogenic) etiology
Pharmacogenomics

nergic, non - cholinergic, NANC)

, , atropine

. Yoshida

가 ATP
가

(26).

가

8.

Primary measures
- Behavioral modification
- Drug therapy (oral, transdermal, intravesical)
Secondary measures
- Neuromodulation
- Augmentation cystoplasty
- Urinary diversion
Others (efficacy debatable)
- Denervation (decentralization)
- Electromagnetic therapy
Under study
- Intravesical drug therapy for deafferentation
- Detrusor injection of botulinum toxin

. Atropine

가

.

(propiverine oxybutinin)
가 .

2.

(Sacral Neuromodulation)

,

(25).

S3

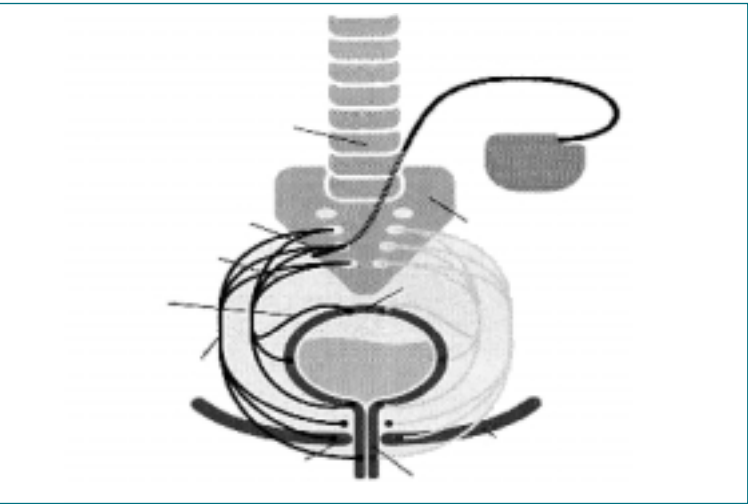
ATP

atropine

(non - adre-

A - delta

,



2.

(27, 28).

, - bladder)	(acontractile		. Lee (30)		50 ~ 60%		70%		
	50%								
	10						17		
	11		,		4		2		
	가				152ml		210ml		
가		가		S3					

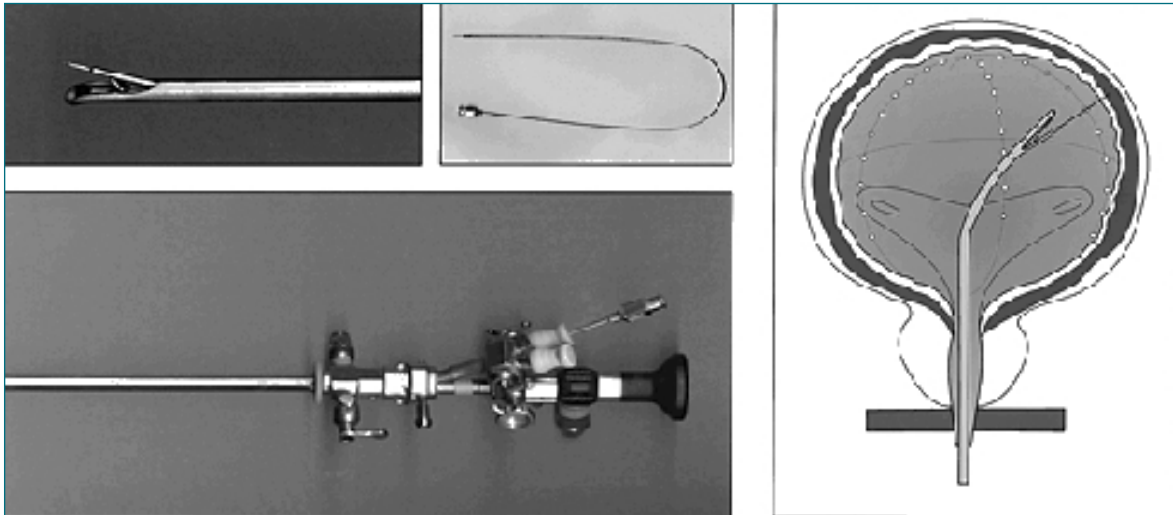
. 1

50%

3. Resiniferatoxin

Capsaicin resiniferatoxin(RTX)

(2)(29). needle	가		tinned		C - (unmyelinated C fiber)		가 . RTX 10nM 1	
	30		가		가		가	
	1		80 ~ 90%, 4		53 ~ 60%		가	
							가	



3.

4. Botulinum - A

Botulinum - A *C. botulinum*

(3~6) 가

가 가

가

,

. 2000 Schurch

, , , ,

- A

,

(31).

200 ~

5. Bladder Denervation Procedure

300unit(10units/ml)

Bladder Denervation

(inferior

20 ~ 30

(3).

hypogastric plexus)

가

Ingelman - Sundberg (

4)

가

(32).

85%

28

44.1

6 ~ 12

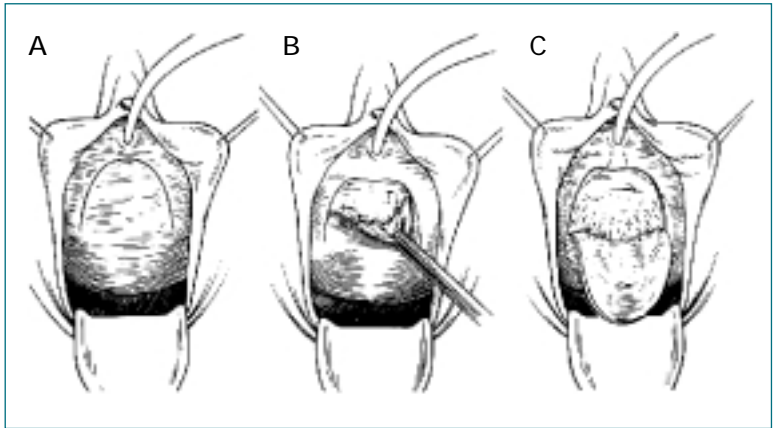
68%

(54%)

(14%)

가

(33).



4. Ingelman - Sundberg denervation

6. (Detrusor Myomectomy or Autoaugmentation) spinal cord)
system)
가

가 .

5 .

(35).

7. (Augmentation Cystoplasty)

가 가 가

가 . 가
15cm 30cm

1.

U

가

20%

가

, , ,
, , ,
, , B12 ,

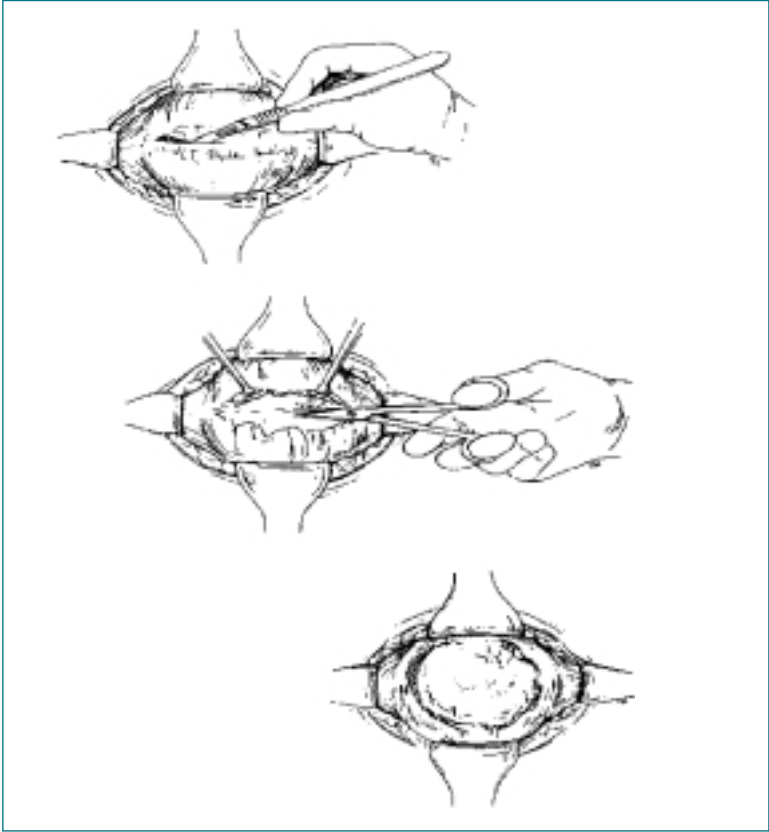
8.

M3

가 . 가

.
(cerebral cortex, midbrain,
(efferent system, afferent
가

(34).



A) Careful division of the detrusor musculature using a knife blade
B) Sharp dissection of the musculature from the mucosa
C) Creation of anterior mucosal diverticulum

5. Detrusor myomectomy procedure

9.

Phenylpropanolamine	Ephedrine(25~50 mg/day)
	Pseudapedeline(30~60 mg/day)
	Meditapp(PPA 15mg, Phenylephrine 15mg)
	Kanaben(PPA 40mg)
	Coryza(PPA 25mg)
	Diet - C(PPM 75mg)
	Roseca - C(PPM 134mg)
	Maxslim(PPM 75mg)
	Premarin(2.5mg/day)
	Estriol(6mg/day)
	Imipramine(Tofranil, 50~75mg/day)

가 (performance)
3~4cm . Biofeedback
pubococcygeus EMG
(urogenital diaphragm) TV 가 .
Signal source rectus
abdominis EMG . Levator ani
complex rectus abdominis EMG
levator ani complex
cone, perineometer, anal pressure profile, urethral
pressure profile, EMG, ultrasound
biofeedback .

1 session 30 1
2 1 . (maintenance
program) home training biofeedback unit
verbal exercise (40).

5~10
10 , 80~160
2~3 .
3 6
17~85% 1
30~50%
(39).

4. Pelvic Floor Electrical Stimulation
(pevic floor electrical stimulation,
functional electrical stimulation, FES)
FES
54~77%
FES
biofeedback
(41, 42).

3. Biofeedback Therapy
가 가

5.
blind folding
가 bio-
feedback visual stimulation 가

Burch

10.

가 (43).

10),

1)

가

(1)

10cm

가

5 ~ 8cm

Retropubic Bladder neck suspension(BNS)

Marshall - Marchetti - Krantz
Burch

Transvaginal needle BNS

Pereyra

Stamey

Raz

Percutaneous BNS

Gittes

Pubic bone fixation

Laparoscopic Burch suspension

Sling

Rectus fascia

Vaginal wall

Tensor fascia lata

TVT(tension - free vaginal tape)

TOT (trans obturator tape)

bulking agent

Autologous fat

Teflon

Bovine collagen

Silicone ploymer

Silicone balloon

(44) 51

2 (

: 34.1)

96.1%

5.8%

, 5.8%

가

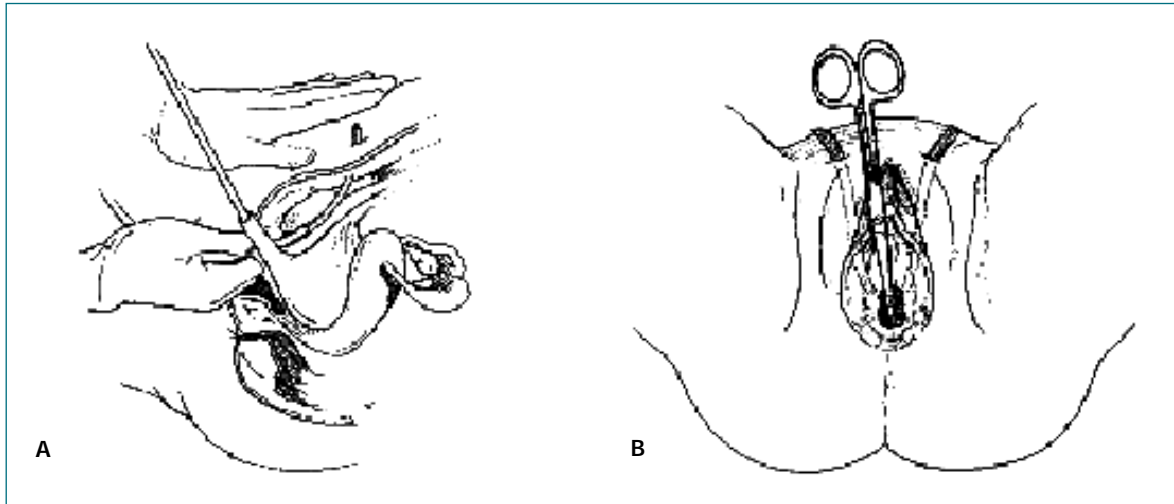
가

89 ~ 99%

가

(45),

5 , 10



A) TVT rigid guide
space)

B) Mayo scissors tape

TVT

(periurethral

tape

6. Tension - free vaginal tape

84 ~ 88%	(46).	50	78%	12%
(2)		(6).		131
1962	Mersilene	1		91%
		, 7%		
		28 , 90%	가	
Polytetrafluoroethylene(PTFE, Teflon), expanded	(48).	3	가	50
PTFE(Gore - Tex), , polyester(ProteGen)	86%	, 11%	mesh	
			TVT	
		가	(49). Meschia	(50) 404
2) Tension - free Vaginal Tape(TVT)	21		92%	4%
	가		, Nilsson	(51) 85
Integral theory(10)	Ulmsten	56		84.7%
(47) tension - free vaginal tape(TVT, Ethicon,	10.6%			
New Brunswick, NJ)				
가 1.5cm mesh		34	TVT	4

11. Tension - free vaginal tape(TVT)

	No. pts.	Cure(%)	Improved(%)	Follow - up (yr.)	Characteristics
Nilsson, et al.	90	84.7	10.6	5	any SUI
Rezapour & Ulmsten	34	82.4	8.8	4	recurrent SUI
Rezapour & Ulmsten	80	85.0	3.8	4	mixed SUI
Rezapour, et al.	49	73.5	12.2	4	ISD

82% , 9% 가

(52). 가

49 4 . SPARC (guide wire)

74% , 12% TVT TVT

가 , . 2003 Deval (56)

70 11.9 ,

(90.4%, King's Health Bristol

11)(53). 2003 TVT 7 가 (54). 72%

90 가 3 TVT 85 가 . 30 ,

5 80 7 44.2%, 11

81.3%가 16.3%가 , 1.3%가 10.5% .

. 87.5%가 5 가 가 36.3%

5.0%가 , 7.5%가 . Burch 7.5% .

169 Burch

, 175 TVT 2 4) TVT Related Complications

Burch 51%, TVT 63% 가

TVT Burch 6.3% 가

(55). .

3) Other Tension - free Vaginal Tape Procedures . 7%, 1%

TVT가 1% (erosion) .

. SPARC sling system(American Medical 2 ,

System, Minneapolis, MN) IVS Tunneller(US . 6

Surgical, Tyco Healthcare Group LP, Norwalk, CT) .

12. Tension - free vaginal tape(TVT)

Complication	Patients* (N)	Median Reported Complication Rate (%)	Range of Complication Rate (%)
Perforation bladder	412/8,229	6.3	0.5~24.2
Bleeding	113/7,255	1.7	0.0~6.7
UTI	124/2,178	7.0	3.16~21.2
Short - term voiding difficulty	373/4,357	7.5	0.0~40.0
Long - term voiding difficulty	266/5,230	3.7	0.0~40.0
Urgency/de novo DO	189/3,875	5.0	0.0~60.0
Vaginal/urethral erosion	13/1,106	-	0.0~0.97
TVT takedown	112/6,219	-	0.0~20.0
Nerve injury	5/1,661	0.6	0.21~0.97
Bowel injury	2/2,831	1.4	0.04~0.78

DO: detrusor overactivity, UTI: urinary tract infection

* Number of patients with the complication divided by the total number of patients in all studies reporting that complication

4%(1.5 ~ 10%) 90% 가 9.7% TVT 90%, 3.3% .
 4 ~ 6 가 가 가
 (12)(57, 58). MONARC(American
 10 ~ 15%, 15 ~ Medical System)가 .
 25% 가 가 Burch Leval(61) TOT
 (59).

5) TOT(Transobturator Suburethral Tape)

inside - out TVT

TVT

(obturator foramen)

가

가

(obturator nerve)



가

3cm

가

. deTayrac (60)

1 TVT ,

1. . In:

TOT TVT

15 27

, ed.

. 1st ed. : , 2003: 429 - 37

TVT

, 13.3%

2. , . An epidemiologic study of female inconti-

TVT 25.8%

, 83.7%,

nence

1997; 1: 55

3. . Prevalence of stress urinary incontinence and bladder irritative symptoms in women: a community based study. 1999; 40: 1200 - 6
4. : 2003; Suppl 2: 96
5. 2004; 45: 543 - 50
6. Herzog AR, Fultz NH, Normolle DP, Brock BM, Diokno AC. Methods used to manage urinary incontinence by older adults in the community. J Amer Geriatr Soc 1989; 37: 339 - 44
7. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Wein A, et al. The standardization of terminology of lower urinary tract function: Report from the standardization subcommittee of international continence society. Neurourol Urodyn 2002; 21: 167 - 78
8. Stamey TA. Endoscopic suspension of the vesical neck for urinary incontinence in females Ann Surg 1980; 192: 465 - 71
9. . In: . 1st ed. : , 2003: 415 - 28
10. Ulmsten U, Petros P. Intravaginal slingplasty: An ambulatory surgical procedure for treatment of female urinary incontinence. Scand J Urol Nephrol 1995; 29: 75 - 82
11. Blaivas JG, Groutz A. Urinary incontinence: pathophysiology, evaluation, and management overview In: Walsh PC, Retik AB, Stamey TA, Vaughan ED Jr, eds. Campbell's urology. 8th ed. Philadelphia: Saunders, 2002: 1027 - 52
12. 1st International Consultation on Incontinence Recommendations of the International Scientific Committee: The evaluation and treatment of urinary incontinence. Incontinence 1998; 945 - 69
13. . In: . 1st ed. : , 2003: 438 - 44
14. . In: . 1st ed. : , 2003: 249 - 58
15. Fantl JA, Wyman JF, McClish DK, Harkins SW, Elswick RK, Hadley EC, et al. Efficacy of bladder training in older women with urinary incontinence. JAMA 1991; 265: 609 - 13
16. Fantl JA. Behavioral intervention for community - dwelling individuals with urinary incontinence. Urology 1998; 51(2A Suppl): 30 - 4
17. Jackson S. The patient with an overactive bladder? symptoms and quality - of - life issues. Urology 1997; 50(6A Suppl): 18 - 22
18. Andersson KE. 1997, 'The overactive bladder: pharmacologic basis of drug treatment'. Urology 1997; 50(6A Suppl): 74 - 84
19. Wein AJ. Pharmacologic options for the overactive bladder. Urology 1998; 51(2A Suppl): 43 - 7
20. Kelleher CJ, Cardozo LD, Khullar V. Salvatore S. 1997, 'A medium - term analysis of the subjective efficacy of treatment for women with detrusor instability and low bladder compliance'. British Journal of Obstetrics and Gynaecology 1997; 104: 988 - 93
21. Drutz HP, Appell RA, Gleason D, Klimberg I, Radomski S. Clinical efficacy and safety of tolterodine compared to oxybutynin and placebo in patients with overactive bladder. International Urogynecology Journal and Pelvic Floor Dysfunction 1999; 10: 283 - 9
22. Appell RA. Electrical stimulation for the treatment of urinary incontinence. Urology 1998; 51(2A Suppl): 24 - 6
23. Choi JH, Han DH, Cho J, Lee KS. Extracorporeal magnetic stimulation for the treatment of overactive bladder durability of efficacy. Korean J Urol 2003; 44(Suppl 2): 160 Abst
24. Wein AJ. Diagnosis and treatment of the overactive bladder. Urology 2003; 62: 20 - 7
25. Macdiamind SA. Overactive bladder: Improving the efficacy of anticholinergics by dose escalation. Curr Urol Rep 2003; 4: 446 - 51

26. Andersson KE, Yoshida M. Antimuscarinics and the overactive detrusor - which is the main mechanism of action? *Eur Urol* 2003; 43: 1 - 5
27. Hohenfellner M, Dahms SE, Matzel K, Thuroff JW. Sacral neuromodulation for treatment of lower urinary tract dysfunction. *BJU Int* 2000; 85(Suppl 3): 10 - 9
28. Wein AJ. Neuromuscular dysfunction of the lower urinary tract and its management. In: Walsh PC, Retik AB, Vaughan ED Jr, et al.(eds), *Campbell's Urology*. 8th ed. Philadelphia: WB Saunders Co., 2002: 931 - 1026
29. Payne CK. Urinary incontinence: nonsurgical management. In: Walsh PC, Retik AB, Vaughan ED Jr, et al. (eds), *Campbell's Urology*. 8th ed. Philadelphia: WB Saunders Co., 2002: 1069 - 91
30. Lee KS, Chung KJ, Kim JC, Joo MS. The effect of sacral neuromodulation in patients with the interstitial cystitis resistant to conservative treatment. *Korean J Urol* 2003; 44(Suppl 2): 74 Abst
31. Schurch B, Stohrer M, Kramer G, Schmid DM, Gaul G, Hauri D. Botulinum - A toxin for treating detrusor hyperreflexia in spinal cord injured patients: a new alternative to anticholinergic drug? Preliminary results. *J Urol* 2000; 164: 692 - 7
32. Gross M, Boone TB, Appell RA. Surgical management of overactive bladder. *Curr Urol Rep* 2002; 3: 388 - 95
33. Westney OL, Lee JT, McGuire EJ, Palmer JL, Cespedes RD, Amundsen CL. Long - term results of Ingelman - Sundberg denervation procedure for urge incontinence refractory to medical therapy. *J Urol* 2002 Sep; 168: 1044 - 7
34. Chancellor MB. New frontiers in the treatment of overactive bladder and incontinence. *Rev Urol* 2002; 4: S50 - S56
35. Atala A. Tissue engineering for the replacement of organ function in the genitourinary system *Am J Transplant* 2004; 4 (Suppl 6): 58 - 73
36. Cardozo L, Bachmann G, McClish D, Fonda D, Birgerson L. Meta - analysis of estrogen therapy in the management of urogenital atrophy in postmenopausal women: second report of the Hormones and urogenital Therapy committee. *Obstet Gynecol* 1998; 92: 722 - 7
37. Kegel A. Progressive resistance exercise in the functional restoration of the perineal muscles. *Am J Gynecol* 1948; 56: 238
38. . In: , ed. . 1st ed. : , 2003: 453 - 60
39. Bo K, Talseth T. Long - term effect of pelvic floor muscle exercise 5 years after cessation of organized training. *Obstet Gynecol* 1996; 87: 261 - 5
40. O'Donnell PD, Doyle R. Biofeedback therapy technique for treatment of urinary incontinence. *Urology* 1991; 37: 432 - 6
41. Kralj B. The treatment of female urinary incontinence by functional electrical stimulation. In: Ostergard DR, Bent AE. *Urogynecology and Urodynamics Theory and Practice*. 4th ed. Baltimore: Williams & Wilkins, 1996: 555
42. Ericksen BC, Eik - Nes SH. Long - term electrostimulation of the pelvic floor: primary therapy in female urinary incontinence? *Urol Int* 1989; 44: 90 - 5
43. , . In: , ed. . 1st ed. : , 2003: 461 - 79
44. , , . 2002; 43: 407 - 11
45. Enzelsberger H, Helmer H, Schatten C. Comparison of Burch and Iyodura sling procedures for repair of unsuccessful incontinence surgery. *Obstet Gynecol* 1996; 88: 251 - 6
46. Laos O, Berglund AL, Bjerle P. Urodynamics in women with stress incontinence before and after surgery. *Eur J Obstet Gynecol Reprod Biol* 1993; 48: 197 - 205
47. Ulmsten U, Falconer C, Johnson P, Jomaa M, Lanner L, Olsson I, et al. A multicenter study of tension - free vaginal tape

- (TVT) for surgical treatment of stress urinary incontinence. *Int Urogynecol J* 1998; 9: 210 - 3
48. Ulmsten U, Johnson P, Rezapour M. A three - year follow up of tension - free vaginal tape for surgical treatment of female stress urinary incontinence. *Br J Obstet Gynecol* 1999; 106: 345 - 50
 49. Meschia M, Pifarotti P, Bernasconi F, Guercio E, Maffioli M, Spreafico L, et al. Tension - free vaginal tape: analysis of outcomes and complications in 404 stress incontinent women. *Int Urogynecol J* 2001; Suppl 2: S24 - S27
 50. Nilsson CG, Kuuva N, Falconer C, Rezapour M, Ulmsten U. Long - term results of the tension - free vaginal tape(TVT) procedure for surgical treatment of female stress urinary incontinence. *Int Urogynecol J* 2001; Suppl 2: S5 - S8
 51. Rezapour M, Ulmsten U. Tension - free vaginal tape(TVT) in women with recurrent stress urinary incontinence - A long - term follow - up. *Int Urogynecol J* 2001a; Suppl 2: S9 - 11
 52. Rezapour M, Falconer C, Ulmsten U. Tension - free vaginal tape(TVT) in stress incontinent women with intrinsic sphincter deficiency(ISO) - A long - term follow - up. *Int Urogynecol J* 2001; Suppl 2: S12 - S14
 53. Nilsson CGN, Rezapour M, Falconer C. 7 years follow - up of the tension - free vaginal tape procedure. *Annual IUGA Meeting Abstract* 2003; 14: S35
 54. Ward KL, Hilton P, on behalf of the UK and Ireland TVT trial group. A prospective multicenter randomized trial of tension-free vaginal tape and colposuspension for primary urodynamic stress urinary incontinence: Two - year follow - up. *Am J Obstet Gynecol* 2004; 190: 324 - 31
 55. Deval B, Levardon M, Samain E, Rafii A, Cortesse A, Amarrenco G, et al. A French multicenter clinical trial of SPARC for stress urinary incontinence. *Eur Urol* 2003; 254 - 9
 56. Balmforth J, Cardozo LD. Trends toward less invasive treatment of female stress urinary incontinence. *Urology* 2003; 62(Suppl 4A): 52 - 60
 57. Boustead GB. The tension - free vaginal tape for treating female stress urinary incontinence. *BJU Int* 2002; 89: 687 - 93
 58. Hardart A, Klutke JJ, Klutke CG, Carlin B. Altered voiding after the tension - free vaginal tape procedure. Is increased resistance the mechanism of therapy? *Obstet Gynecol* 2000; 95(Suppl 1): S35