Management of Female Stress Urinary Incontinence

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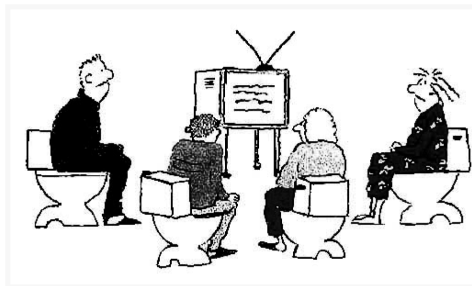
Definition of Urinary Incontinence:

Involuntary loss of urine per urethra

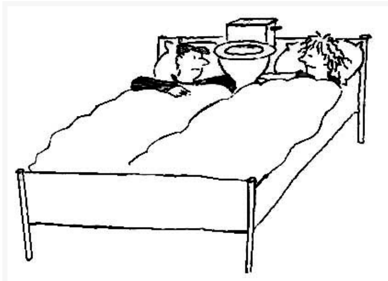
Prevalence

- Depends on diagnostic criteria and studied population
- 21% in Hong Kong women aged 10-90 suffered stress urinary incontinence
  - Brieger GM et al , Hong Kong Med J. 2005; 11: 158-63
- 41% of female aged 17-77 suffered stress incontinence
  - Wong T el al. Int Urogynecol J Pelvic Floor Dysfunct March 2006
- 34% of female age 10-90 experienced stress incontinence
  - Pang MW et al, Hong Kong Med J 2005 Jun; 11(3): 158-63

Female Urinary Incontinence



Female Urinary Incontinence



Types of Urinary Incontinence

- Stress incontinence
- Urge incontinence
- Mixed incontinence
- Overflow incontinence

Type of Urinary Incontinence

- **Stress incontinence**:involuntary leakage on effort or exertion, or on sneezing or coughing
- **Urge incontinence**: involuntary leakage accompanied by or immediately preceded by urgency
- **Mixed**: involuntary leakage associated with urgency and also with exertion, effort, sneezing and coughing
- **Overflow**: incontinence associated with retention of urine

Stress Urinary Incontinence

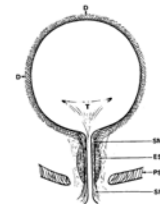
- Definition: involuntary leakage on effort or exertion, or on sneezing or coughing

Mechanism for Continence

- Intact anatomical Support
- Intact intrinsic urethral sphincter mechanims

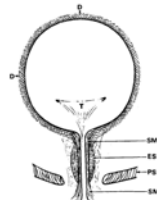
Pathophysiology of SUI

- Anatomical support:
  - an intact pelvic floor that hold the bladder neck and proximal urethra in place even in case of increased intra-abd pressure

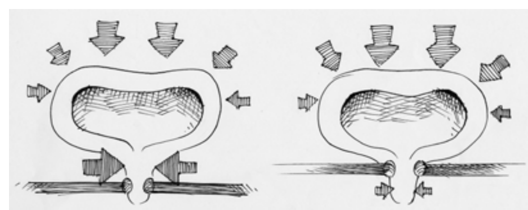


Pathophysiology of SUI

- **Intrinsic urethral mechanisms**:
  - Coaptation
    - Mucosa
    - Submucosa
  - Compression
    - Submucosa
    - Internal sphincter
    - External sphincter



Classical Hypothesis



Integral & Hammock Theory

- Integral theory:
  - Described by Petros and Ulmsten in 1990
- Hammock theory:
  - Proposed by DeLancey in 1994
- Both suggested the importance of efficient transmission of pressure to the bladder neck and proximal urethra against a well supported urethra

Genuine Stress Incontinence

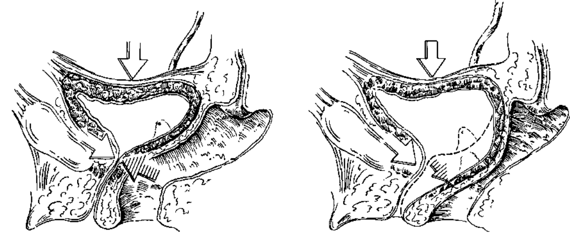


FIG. 25-1 *Anatomic support of a continent woman. In a continent woman with good anatomic support, increases in intra-abdominal pressure that act on the bladder also act on the proximal portion of the urethra* (open arrows). *This abdominal force acting upon the proximal portion of the urethra meets the support provided by strong ligaments* (shaded arrow), *resulting in compression of the urethra and continence.*

FIG. 25-2 *Loss of anatomic support in an incontinent woman. In the woman with poor anatomic support, increases in intra-abdominal pressure meet no resistive force. The weakened anatomic support* (shaded arrow) *allows the bladder neck and urethra to rotate down and posteriorly. The urethra is not compressed, and incontinence results.*

Aetiology of SUI

- Pelvic floor laxity as a result of repeated child birth
- Others: previous surgery, radiation damage, neurological insult

Evaluation of SUI

- History
- Physical examination
- QOL assessment
- Voiding Diary
- Pad test
- Urinalysis
- Flow rate and residual urine study
- USG kidneys and bladder
- Urodynamic Study

History

- Nature, duration and severity of incontinence
- Identify risk factors
- Hx of previous therapy
- Hx of neurological disease
- Hx of pelvic surgery, pelvic irradiation or spinal surgery

Physical Examination

- General Examination
- Anatomical and neurological abnormalities
- Vaginal examination
  - Pelvic organ prolapse
  - Pelvic floor muscle contraction
- Stress test
- QOL Qestionnaire

排尿日記

時間	飲料/份量	排尿量	遺尿程度	遺尿時活動	尿急感覺
:					
:					
:					
:					

Pad Test

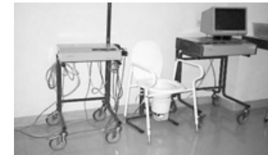
- Semi-objective assessment of the quality of urine loss
- One hour, two hours, or 24 hours
- ICS recommends using the one hour pad test
- Drinks 500 ml fluid and then perform a series of standardised activities like walking upstairs, running, rising from the squatting position etc
- Insignificant if weight gain < 2gm/1 hour

Urinalysis

- Indicated if patient c/o haematuria or UTI is suspected

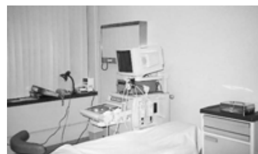
Uroflow and residual urine

- Simple study to detect other voiding dysfunction
- Help to indicate need for further Ix



USG Kidneys + Bladder

- Not routinely done
- Indicated if bladder or kidney pathology is suspected or in patients with neurogenic bladder



??? Urodynamic Study

Indications for UDS

- When other pathology is suspected
- Neurogenic bladder
- For assessment before operative Rx

Management of SUI

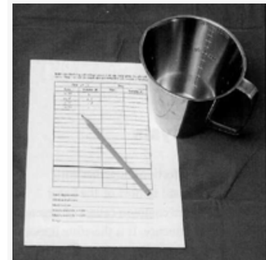
- Conservative Mx
- Surgical Mx

Conservative Management

- Behavioral Modification
- Pharmacotherapy
- Pelvic floor exercise

Behavioral Modification

- Diet and lifestyle changes: avoidance of caffeine, stop smoking etc
- Fluid management
- Timed voiding
- Bowel habit: avoid constipation



Pharmacotherapy

- Estrogen
- Alpha-adrenergic agonist: eg. ephedrine
- Serotonin(5-HT) and noradrenaline reuptake inhibitor

Duloxetine

- Causes accumulation of 5-HT and NA in the synapses of Onuf's nucleus
- 5-HT and NA amplify the effect of glutamate and as such increase pudendal nerve activity and urethral striated muscle contraction / urethral closure during urine storage

Duloxetine

- Significantly reduces incontinence frequency and improve the patient's QOL

Common Side Effects

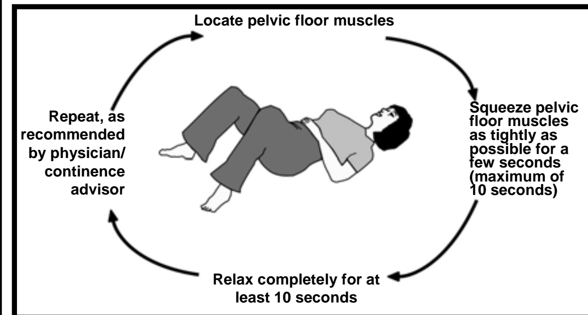
TEAE / Rate (%)	Duloxetine (N = 958)	Placebo (N = 955)
Any TEAE	76.1*	57.5
Nausea	23.2*	3.7
Dry mouth	13.4*	1.5
Fatigue	12.7*	3.8
Insomnia	12.6*	1.9
Constipation	11.0*	2.3
Headache	9.7*	6.6
Dizziness	9.5*	2.6
Somnolence	6.8*	0.1
Diarrhoea	5.1*	2.7

* TEAEs (treatment emergent adverse events) ≥ 5% and significantly more common than with placebo
Summary of Product Characteristics; Hurley DJ, et al. Int J Gynaecol Obstet 2003;83(Suppl 3):95 (abs TP82)

Duloxetine

- Approved for use in patients with moderate to severe SUI in Europe
- Not approved in the States by the FDA because of several suicidal deaths associated with withdrawal of the drug
- Not available in HK yet

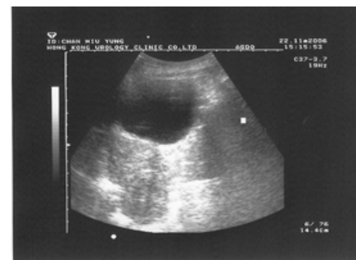
Pelvic Floor Exercise



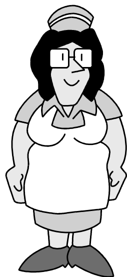
Pelvic Floor Exercise

- Make sure patients contract the appropriate muscle
- Biofeedback
  - Vaginal cone
  - Perineometer

PFE with the aid of Real Time USG



Pelvic Floor Exercise



- **Need a dedicated nurse to supervise the therapy and follow up the patients**

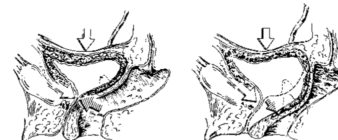
Extracorporeal Pelvic Floor Magnetic Stimulation

- Non-invasive
- Principle: A changing magnetic field induce a flow of electrons within the field and thus induces controlled depolarization of adjacent nerves and contraction of the pelvic floor muscles
- ?? efficacy

Surgical Treatment for SUI

Goal of Surgery for SUI

- Prevention of urethral descent
- To provide a backboard against which the bladder neck and proximal urethra can be compressed during increases in intra-abdominal pressure

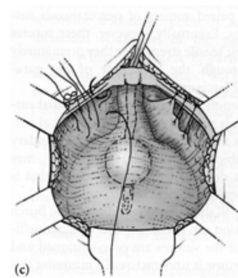


Surgical Rx for SUI

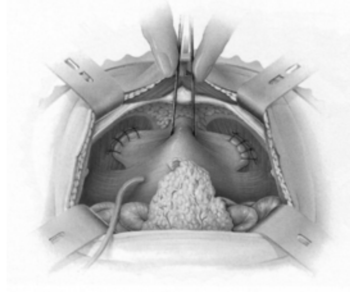
- Colposuspension
- Pubovaginal Sling
- Urethral Tape (TVT/TOT)
- Injectables
- Artifical Urinary Sphincter

Burch Colposuspension

- Described in 1961
- Lateral fixation of urethrovaginal tissue to the Cooper's ligament:
- Complications:
  - Enterocoele (5-30%)
- Modification: Vagino-obturator Shelf Operation



Vagino-obturator Shelf Operation

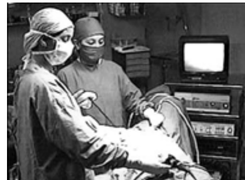


Results of Colposuspension

Study	No. of patients	Follow-up	Success rate (%)
BURCH			
Lose et al	80	26m	63
Bergman et al	101	12m	87
Langer et al	122	3-6m	88
Kiilholma et al	186	6-24m	91
Feyereisl et al	87	5-10y	82
Amaye-Obu et al	49	2-6y	69
Tegerstedt et al	131	5-11y	93
Meltomaa et al	143	4.9y	79

Laparoscopic Colposuspension

- First published by VanCaille in 1991
- Intraperitoneal and extraperitoneal approach
- Longer operative time (62.6 minutes vs 49.2 minutes)
- Less blood loss and less post-op narcotic requirements and shorter hospital stay

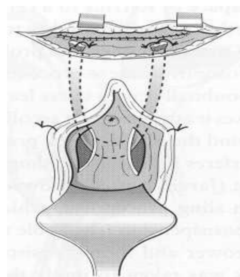


Laparoscopic Colposuspension

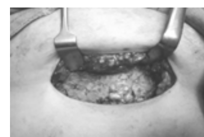
Study	No. of patients	Follow-up	Success rate (%)
Polascik et al	12	20.8m	83
Radomski et al	34	17.3m	85
Cooper at al	113	8.4m	87
Saidi et al	70	12.9m	91.4
McDougall et al	58	45m	30

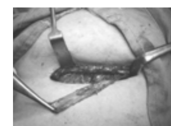
Traditional Pubovaginal Sling

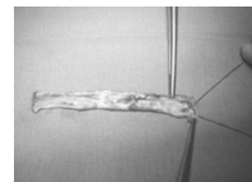
- Sling placed at the level of the bladder neck
- Sling extends into the retropubic space on both sides



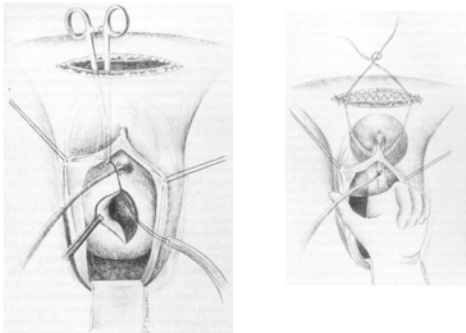
Harvesting of the Rectus Sheath Sling







Pubovaginal Sling



Slings

- Reported cure rate : 82%-95%
  - Morgan et al JUrol2000 163:1845-8
  - McGuire et al JUrol 1987 138:525-6
  - Blavis et al JUrol 1991 145:1214-8
- Female Stress Urinary Incontinence Clinical Guidelines Panel of the American Urological Association 1997: retropubic suspensions and sling procedures were the most durable procedures with the longest outcome for dryness

Sling Material

- Autologous
  - Rectus sheath
  - Fascia lata
- Cadaveric fascia lata
- Synthetic: polypropylene

Autologous Sling Material

- Advantages
  - Easily harvested
  - Durable
  - Rarely cause urethral erosion
- Disadvantages
  - Increased wound morbidity
  - Increased operative time
  - Increased hospital stay and time off from normal activities

Cadaveric Fascia

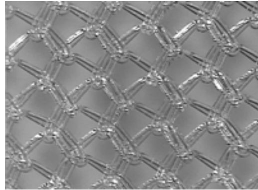
- Advantages
  - Less morbidity
  - Shorter operative time and hospital stay
  - Low risk of urethral erosion
- Disadvantages
  - Rapid dissolution
  - ? Long term outcome
  - Risk of transmission of disease

Synthetic Sling Material

- Advantages
  - Unlimited supply
  - Consistent in quality and durable
  - Short operative time and hospital stay
- Disadvantages
  - Infection
  - Urethral erosion

Synthetic Sling Material

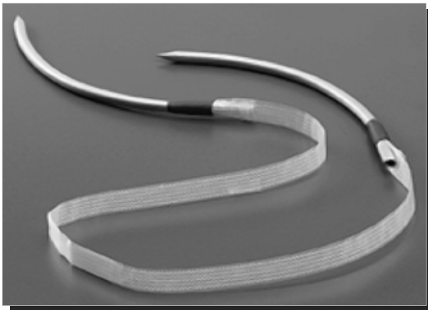
- Loosely woven
- No tension



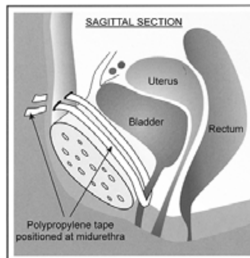
Tension Free Vaginal Tape

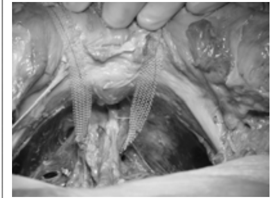
- First described by Ulmsten in 1996
- A polypropylene tape placed at mid-urethra
- Tension free urethral support
- Minimal invasive
- Short hospital stay
- Quick return to normal daily activities
- Few million tapes have been implanted worldwide in the past years

Tension-free Vaginal Tape

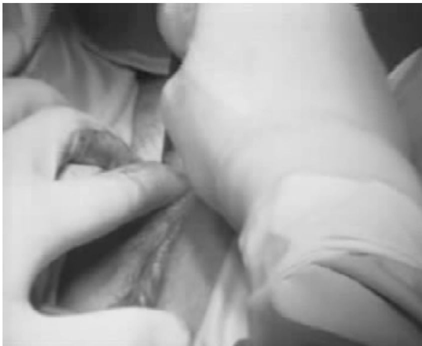


Position of the Urethral Tape





Tension free vaginal tape



Complications of TVT

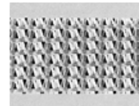
- Bladder perforation: 1-6%
- Voiding difficulties (including retention of urine): 0- 4%
- Others:
  - Vascular injuries
  - Pelvic haematoma
  - Obturator nerve injury
  - Bowel injury
  - Erosion
  - Infection

Sparc

- Introducer needles are slimmer and are passed through the retropubic space suprapubically

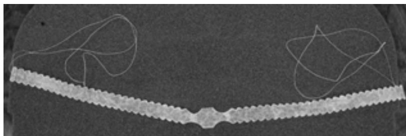
Intravaginal Sling (IVS)

ATRAUMATIC CONICAL TIP



MONOFILAMENT POLYPROPYLENE TAPE

Other Sling Material



- Bovine small intestine submucosa

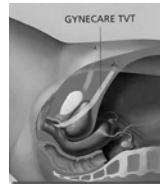
Results of Urethral Tape

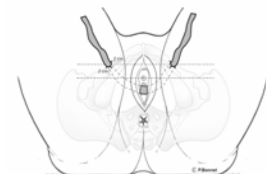
- 85% cure rate at 1-3 year follow-up
  - Ulmsten U et al Br J Obstet Gynaecol 1999;106:345-350
  - Olsson I et al Gynecol Obstet Invest 1999;48:267-269
- 85% cure rate at 5 year follow-up
  - Nilson et al Inter Urogyne Journal 2001(suppl 2): S5-S8

Newer Midurethral Tape

- Transobturator tape
  - Avoid retropubic space
  - Decrease in Cx of bladder perforation and vascular injury

Sling:
TVT (Ulmsten 1996) vs TOT(Delorme 2001)





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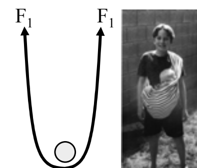

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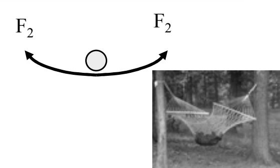
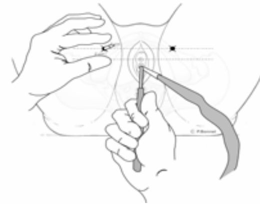
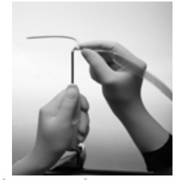
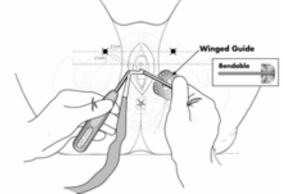


Why the Obturator Approach?

- Avoiding retropubic space:
  - Minimizing risk of bladder perforation
  - Minimizing risk of retropubic hematoma
  - Avoidance of bowel
  - Reduction in major vascular injury
- Potential benefits
  - Lower incidence of retention and/or de novo urgency
- speed of procedure appealing

Transobturator Tape

Transobturator tape

- 83 consecutive patients
- 46 had previous pelvic/ incontinence surgery
  - Cured 85%
  - Improvement 11.2%
  - Failure 3.8%
  - Complication 0%

Leval et al. Annual meeting, European Association of Urology, 2005

TOT vs TVT

- Still need randomised control study to compare the efficacy and complication rate of TOT vs TOT

Surgical Rx for SUI

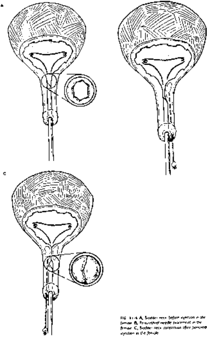
- Colposuspension
- Pubovaginal Sling
- Suburethral Tape (TVT/TOT)
- Injectables
- Artifical Urinary Sphincter

The injectables

- Periurethral injection of bulking agents
- Deposition of bulking agents within the submucosa of the proximal urethra and bladder neck

The injectables

- Materials: collogen, teflon, silicone microimplants(macroplastique), hyaluronic acid, destranomer microspheres(deflux), autologous fat
- Success rate only 25-50 % and result not durable requiring repeated injection
- Reserved for patients not fit for surgery only



Surgical Rx for SUI

- Colposuspension
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- Suburethral Tape (TVT/TOT)
- Injectables
- Artifical Urinary Sphincter

Artificial Urinary Sphincter

Conclusions

- SUI is a common problem
- Treatment depends on the nature and severity of the condition
- Patients should be provided with information on various choices of Rx (conservative & operative)
- With appropriate Rx patients could be cured of the incontinence and thus improving the quality of life