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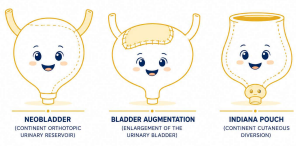


THE MECHANICS OF CONTINENT URINARY DIVERSIONS

Erika M. Orban, DNP(c) MSN ARNP
AGPCNP-BC CUNP CWOCN-AP

2

DISCLOSURE OF FINANCIAL RELATIONSHIPS

- I have the following relevant relationship(s) to disclose:
  - Convatec Group PLC (Continence Care)– Consultant, Speaker's Bureau

3

LEARNING OBJECTIVES

By the end of this session, participants will be able to:

- Describe the mechanics of continent urinary diversions, including reservoir compliance, pressure dynamics, and continence mechanisms.
- Differentiate major continent diversion types, including orthotopic neobladders and catheterizable cutaneous reservoirs (as well as a special mention for bladder augmentation).
- Apply practical nursing strategies for postoperative management, troubleshooting, and long-term patient education.

At the end of this session, my hope is that continent diversions feel less mysterious and more like impressive plumbing.

4

Poll Slide 1

What's the most intimidating part of continent diversions?

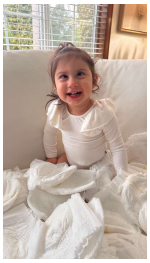
A. Catheterization/Valsalva (basically how to empty it)
B. Mucus management (so much gunk)
C. Pressure dynamics
D. Troubleshooting leakage
E. Patient education & long-term teaching
F. Emotionally exhausted just reading these options, can we go back to a Foley?

5

What's the most intimidating part of continent diversions?

6

A NOTE ON CONTINENCE AND HUMAN DIGNITY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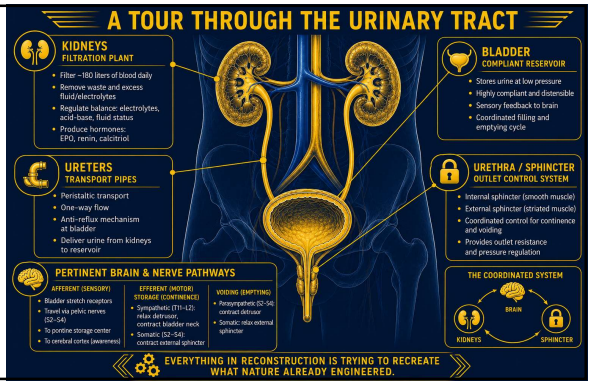
THE PLUMBING TOUR



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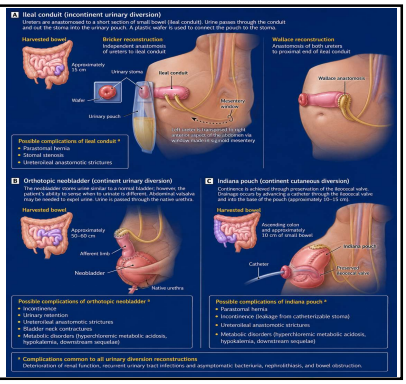
WHAT COULD GO WRONG?!

- Cancer
- Neurogenic bladder
- Trauma
- Radiation injury
- Congenital anomalies
- Fibrosis / contracted bladder
- Refractory lower urinary tract dysfunction
- Renal deterioration

Over time, the native bladder may become unsafe, poorly compliant, nonfunctional, or incompatible with a patient's (quality of) life.

9

TYPES OF URINARY DIVERSIONS



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Poll Slide 2

What is the MOST important functional goal of a continent urinary diversion?

A. Reducing urinary tract infections
B. Achieving reliable continence and dryness
C. Ensuring complete bladder emptying
D. Protecting the upper urinary tract and kidneys
E. Improving independence and quality of life

11

Do not edit
How to change the design

What is the MOST important functional goal of a continent urinary diversion?

ⓘ The Slido app must be installed on every computer you're presenting from slido

12

WHAT MAKES A GOOD RESERVOIR?

This is the foundation for EVERYTHING that comes from here on out:

- Low pressure
- Adequate capacity
- High compliance ($Compliance = \frac{\Delta Volume}{\Delta Pressure}$)
- Reliable emptying
- Continence
- ***Protection of upper tract/kidneys***
- Preserves quality of life

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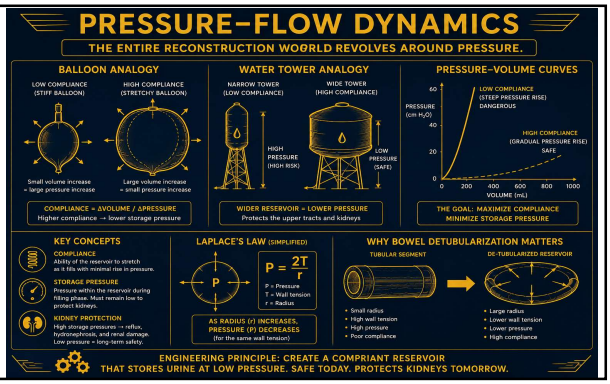
THE PHYSICS OF PEE



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CONTINENCE MECHANISMS

Last foundational piece before we start building our reservoirs:

- Outlet resistance (kinked garden hose)
- Flap valves (screen door in the wind)
- Nipple valves (sock inverted into a shoe)
- Tunneled segments (straw tapered to a water balloon)
- Angulation (sharp bend in a hose)
- Reservoir pressure vs outlet pressure (water tower vs. valve)

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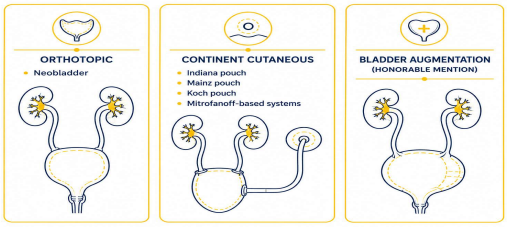
FOR OUR REVIEW TODAY:



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TWO ROADS TO CONTINENCE

Feature	Orthotopic	Continent Cutaneous
Voiding Route	Native urethra	Catheterizable stoma
Catheterization Needed	Sometimes	Usually
Body Image / Cosmesis	More "natural" voiding pathway	Easier abdominal access
Typical Candidate Profile	Motivated patient with functional urethra and adequate continence potential	Patient with dexterity and reliable catheterization ability
Emptying Method	Valsalva, pelvic floor relaxation, occasional CIC	Scheduled clean intermittent catheterization
Continence Mechanism	Outlet resistance at urethra/pelvic floor	Catheterizable continence channel/valve mechanism
Common Examples	Neobladder	Indiana pouch, Mainz pouch, Koch pouch
Key Nursing Considerations	Retention, hypercontinence, pelvic floor adaptation, nighttime leakage	Stomal care, catheterization schedule, mucus management, leakage (above and below)
Major Functional Goal	Low-pressure storage with urethral voiding	Low-pressure storage with reliable catheterizable emptying
Long-Term Risks	Retention, metabolic abnormalities, incontinence	Stomal stenosis, pouch stones, catheterization difficulties

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CONTINENT CUTANEOUS DIVERSIONS OVERVIEW

Core idea: A low-pressure internal reservoir emptied intermittently via catheterization. The three pouches are variations on a theme.

- Pouches
  - Kock Pouch
  - Mainz Pouch
  - Indiana Pouch
- Channels: Mitrofanoff/Yang-Monti/CCIC Principles

Each iteration tried to improve:

- Continence reliability
- Ease of catheterization
- Long-term durability
- Fewer revision surgeries

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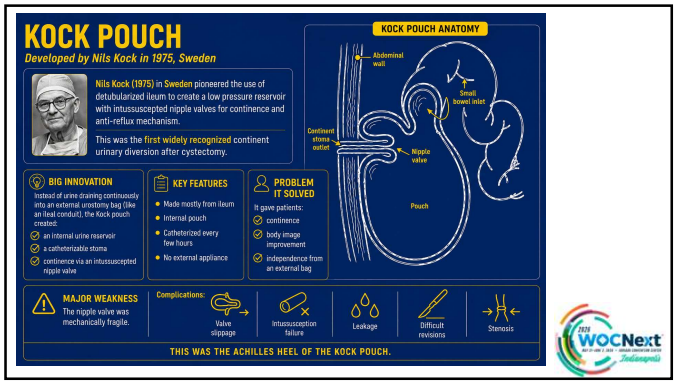
KOCK POUCH
Developed by Nils Kock in 1975, Sweden
Nils Kock (1975) in Sweden pioneered the use of detubularized ileum to create a low pressure reservoir with intussuscepted nipple valves for continence and anti-reflux mechanism.
This was the first widely recognized continent urinary diversion after cystectomy.
KOCK POUCH ANATOMY
Abdominal wall
Small bowel inlet
Continent stoma outlet
Nipple valve
Pouch
BIG INNOVATION
Instead of urine draining continuously into an external urostomy bag (like an ileal conduit), the Kock pouch created:
an internal urine reservoir
a catheterizable stoma
continence via an intussuscepted nipple valve
KEY FEATURES
Made mostly from ileum
Internal pouch
Catheterized every few hours
No external appliance
PROBLEM IT SOLVED
It gave patients:
continence
body image improvement
independence from an external bag
MAJOR WEAKNESS
The nipple valve was mechanically fragile.
Complications:
Valve slippage
Intussusception failure
Leakage
Difficult revisions
Stenosis
THIS WAS THE ACHILLES HEEL OF THE KOCK POUCH.

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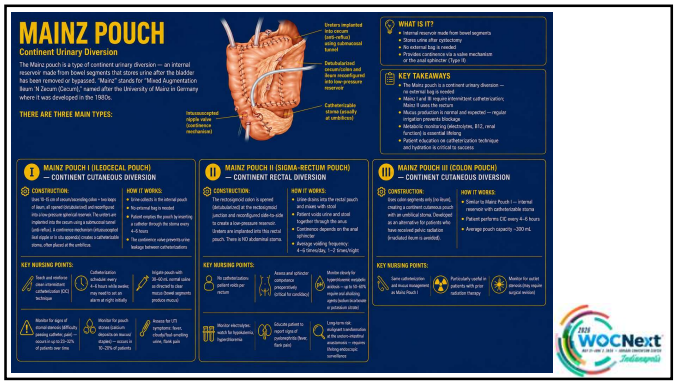
MAINZ POUCH
Continent Urinary Diversion
The Mainz pouch is a type of continent urinary diversion — an internal reservoir made from bowel segments that stores urine after the bladder has been removed or bypassed. "Mainz" stands for "Mixed Augmentation Baum 'N Zecum (Cecum)," named after the University of Mainz in Germany where it was developed in the 1980s.
THERE ARE THREE MAIN TYPES:
Ureters implanted into cecum (anti-reflux) using submucosal tunnel
Detubularized (muscularis cut) ileum reconfigured into low-pressure reservoir
Catheterizable stoma (usually at umbilicus)
Intussuscepted nipple valve (continence mechanism)
WHAT IS IT?
Internal reservoir made from bowel segments
Stores urine after cystectomy
No external bag is needed
Provides continence via a valve mechanism at the skin surface (Type II)
KEY TAKEAWAYS
The Mainz pouch is a continent urinary diversion — no external bag is needed
Mainz I and III require intermittent catheterization; Mainz II uses the rectum
Mucus production is normal and expected — regular irrigation prevents blockage
Metabolic monitoring (electrolytes, B12, renal function) is essential lifelong
Patient education on catheterization technique and hydration is critical to success
I MAINZ POUCH I (ILEOCECAL POUCH) — CONTINENT CUTANEOUS DIVERSION
CONSTRUCTION:
HOW IT WORKS:
KEY NURSING POINTS:
II MAINZ POUCH II (SIGMA-RECTUM POUCH) — CONTINENT RECTAL DIVERSION
CONSTRUCTION:
HOW IT WORKS:
KEY NURSING POINTS:
III MAINZ POUCH III (COLON POUCH) — CONTINENT CUTANEOUS DIVERSION
CONSTRUCTION:
HOW IT WORKS:
KEY NURSING POINTS:

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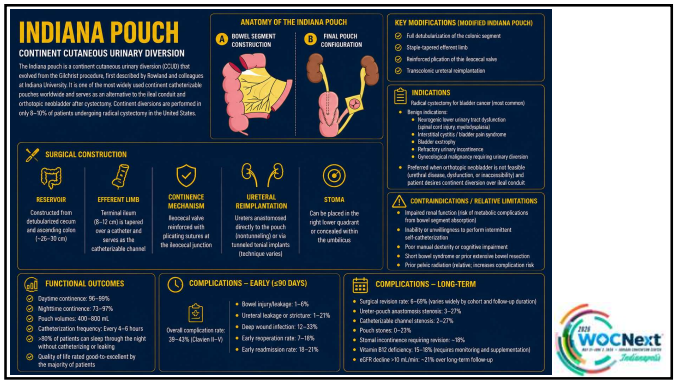
INDIANA POUCH
CONTINENT CUTANEOUS URINARY DIVERSION
The Indiana pouch is a continent cutaneous urinary diversion (CCUD) that evolved from the Gilchrist procedure, first described by Rowland and colleagues at Indiana University. It is one of the most widely used continent catheterizable pouches worldwide and serves as an alternative to the ileal conduit and orthotopic neobladder after cystectomy. Continent diversions are performed in only 8–10% of patients undergoing radical cystectomy in the United States.
ANATOMY OF THE INDIANA POUCH
A BOWEL SEGMENT CONSTRUCTION
B FINAL POUCH CONFIGURATION
KEY MODIFICATIONS (MODIFIED INDIANA POUCH)
Full detubularization of the colonic segment
Staple-tapered efferent limb
Reinforced plication of the ileocecal valve
Transcolonic ureteral reimplantation
SURGICAL CONSTRUCTION
RESERVOIR
Constructed from detubularized cecum and ascending colon (~26–30 cm)
EFFERENT LIMB
Terminal ileum (8–12 cm) is tapered over a catheter and serves as the catheterizable channel
CONTINENCE MECHANISM
Ileocecal valve reinforced with plicating sutures at the ileocecal junction
URETERAL REIMPLANTATION
Ureters anastomosed directly to the pouch (nonstenting) or via tunneled ileal implants (technique varies)
STOMA
Can be placed in the right lower quadrant or concealed within the umbilicus
INDICATIONS
Radical cystectomy for bladder cancer (most common)
Benign indications:
Neurogenic lower urinary tract dysfunction (spinal cord injury, myelodysplasia)
Interstitial cystitis / bladder pain syndrome
Bladder exstrophy
Refractory urinary incontinence
Gynecological malignancy requiring urinary diversion
Preferred when orthotopic neobladder is not feasible (urethral disease, dysfunction, or inaccessibility) and patient desires continent diversion over ileal conduit
CONTRAINDICATIONS / RELATIVE LIMITATIONS
Impaired renal function (risk of metabolic complications from bowel segment absorption)
Inability or unwillingness to perform intermittent self-catheterization
Poor manual dexterity or cognitive impairment
Short bowel syndrome or prior extensive bowel resection
Prior pelvic radiation (relative; increases complication risk
FUNCTIONAL OUTCOMES
Daytime continence: 96–99%
Nighttime continence: 73–97%
Pouch volumes: 400–800 mL
Catheterization frequency: Every 4–6 hours
>80% of patients can sleep through the night without catheterizing or leaking
Quality of life rated good-to-excellent by the majority of patients
COMPLICATIONS – EARLY (≤90 DAYS)
Overall complication rate: 28–43% (Clavien II–V)
Bowel injury/leakage: 1–6%
Ureteral leakage or stricture: 1–21%
Deep wound infection: 12–33%
Early reoperation rate: 7–18%
Early readmission rate: 18–21%
COMPLICATIONS – LONG-TERM
Surgical revision rate: 6–60% (varies widely by cohort and follow-up duration)
Ureter-pouch anastomosis stenosis: 3–27%
Catheterizable channel stenosis: 2–27%
Pouch stones: 0–23%
Stomal recruitment requiring revision: ~18%
Vitamin B12 deficiency: 15–18% (requires monitoring and supplementation)
eGFR decline >10 mL/min: ~21% over long-term follow-up

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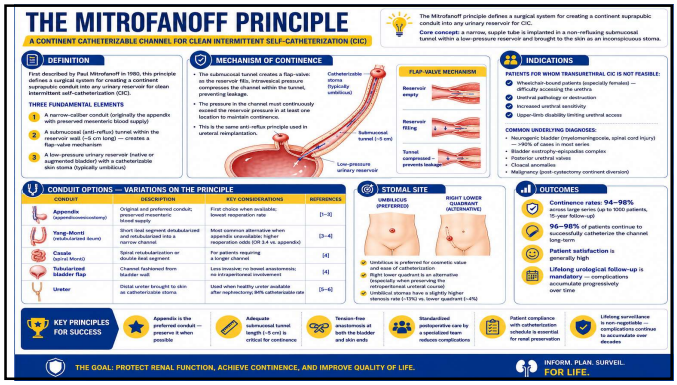

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PERIOPERATIVE CARE

- Stents
- Multiple drains
- Irrigation
- Mucus production management
- Strict catheterization schedules
- Avoiding overdistension

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LONG-TERM MANAGEMENT

- Mucus management
- Stone risk
- Metabolic acidosis
- Vitamin B12 deficiency
- Renal surveillance
- Stomal stenosis
- Catheterization
- Leakage (peristomal skin complications)
- Reservoir perforation

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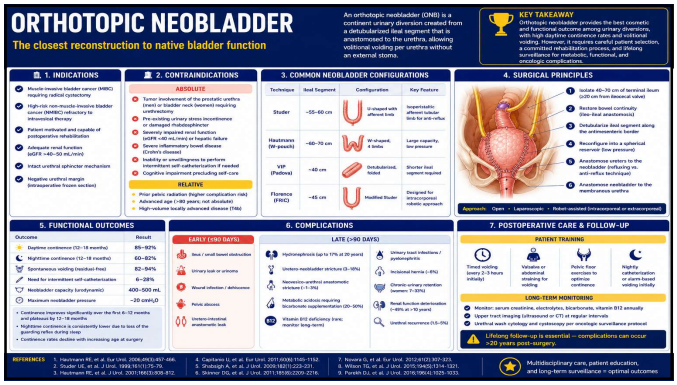

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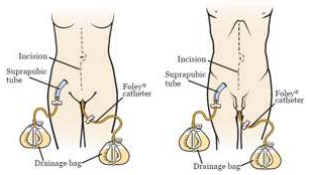
EARLY POSTOPERATIVE PHASE

- Irrigation
- Mucus plugging
- Anastomotic protection
- Continence training
- Scheduled emptying



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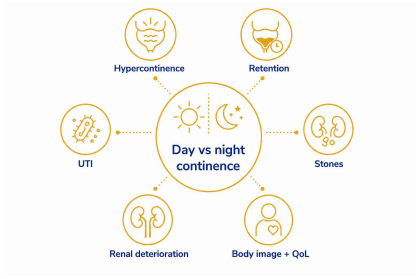
LONG-TERM OUTCOMES AND COMPLICATIONS



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PEARLS

- Leakage ≠ always failure
- Never force catheterization, dig for underlying cause
- Mucus is normal
- Timed emptying matters
- High pressure threatens kidneys
- Nighttime leakage is common (daytime continence 82%, nighttime 62% at 12 months)

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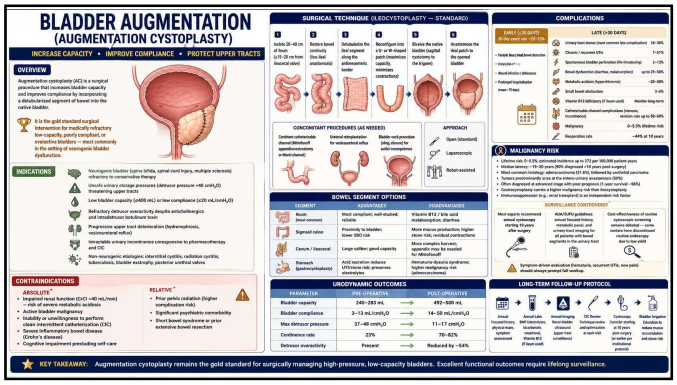

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PHARMACOLOGIC MANAGEMENT

- Anticholinergics
- Beta-3 agonists
- Bowel management meds
- Antibiotic stewardship
- Urinary acidification/ alkalinization
- Metabolic acidosis management *(bicarbonate)*
- Mucolytics *(limited evidence but discussed clinically)*
- Supplements

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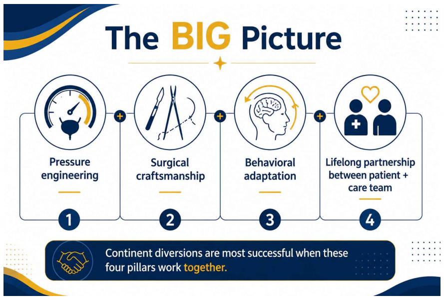

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