AUA 2026
Washington, DC
MAY 15-18

018IC - Complications of Robotic Urological Surgery: Prevention, Recognition, and Management

Friday, May 15

Faculty

Rene Sotelo, MD

David Canes, MD

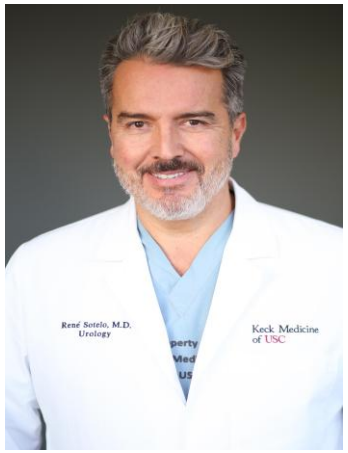
Mihir Desai, MD

Michael D. Stifelman, MD

AUA 2026
MAY 15-18
Washington, DC

018IC - Complications of Robotic Urological Surgery: Prevention, Recognition and Management

AUA 2026
Washington, DC
MAY 15-18



René Sotelo MD, MDMM
Course Director
Professor of Clinical Urology
USC Institute of Urology

Director of the Department of
International Medicine of the
University of Southern California

Michael Stifelman, MD
Director of Robotic Surgery and
Professor of Urology
Hackensack Meridian Health

Chair of Urology
Hackensack University Medical Center

David Canes, MD
Associate Professor of Urology
Tufts University School of Medicine

Senior Staff Surgeon at
Lahey Hospital and Medical Center

Director of Robotic Surgery at
Parkland Hospital, Derry NH

René Goh, MD
Director of Robotic Urologic Surgey
Technology and Education

AUA 2026
Washington, DC
MAY 15-18

Sharing is Caring

Sharing your complications translates to improvements in patient care

Dr. René Sotelo
@DoctorSotelo

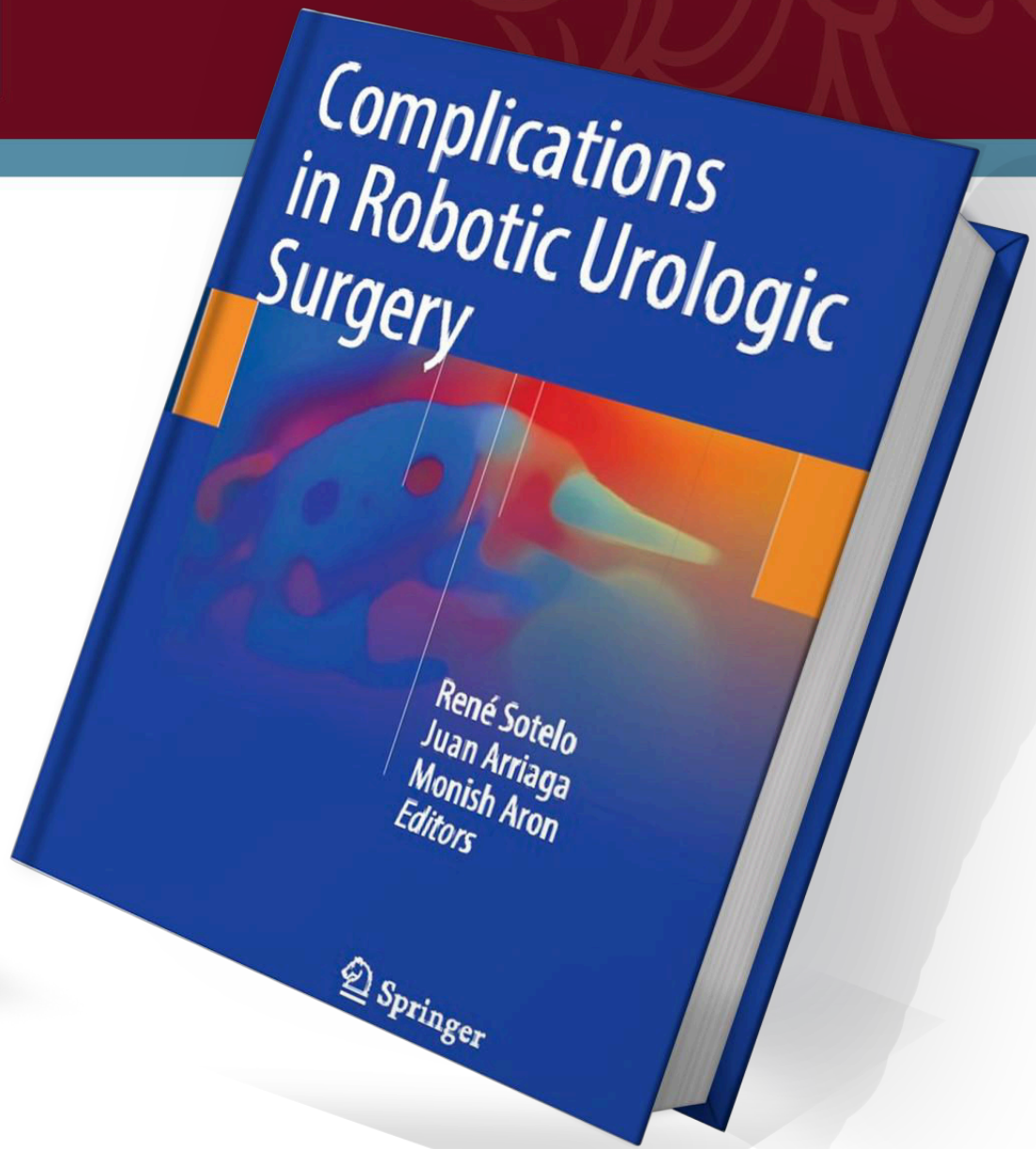
Disclosures:

- Lexion
- Astellas
- AstraZeneca
- Johnson and Johnson

This course materials intends to aid urologists/surgeons in preventing, diagnosing, and managing urological/surgical complications during minimally invasive procedures.

The presentation material was provided by urologists around the world, who have kindly agreed to share their experiences so that others can learn from and avoid these complications.

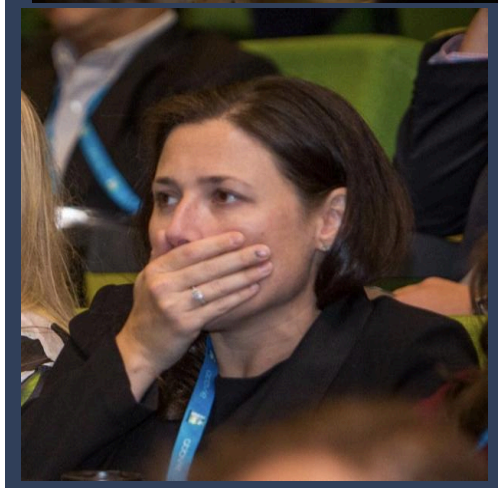
AUA-2026
Washington, DC
MAY 15-18



AUA 2026
Washington, DC
MAY 15-18

AUA 2025
APRIL 26-29
Las Vegas





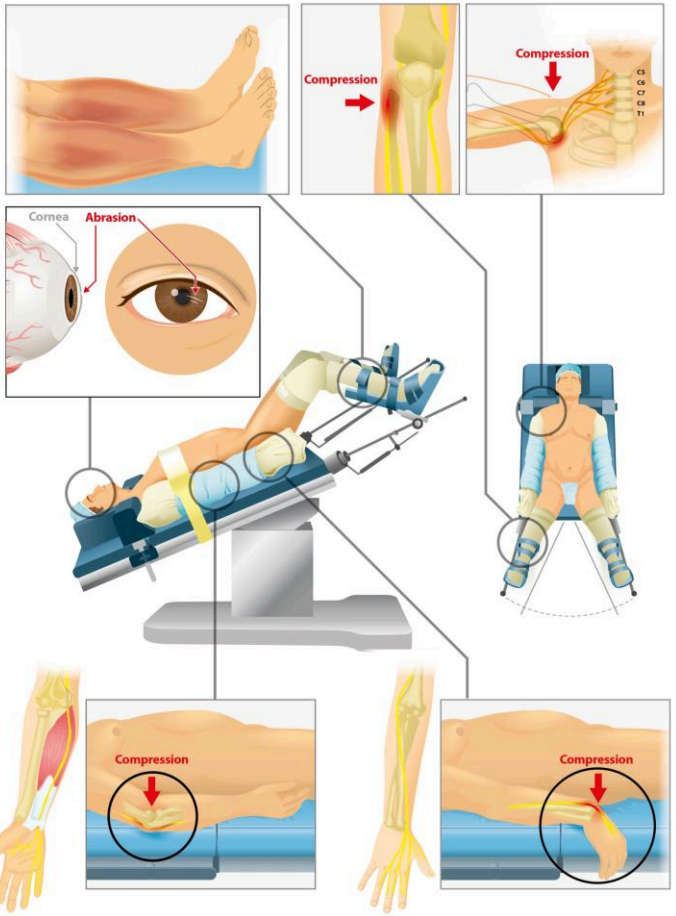

Never Feel Ashamed To Ask For Help

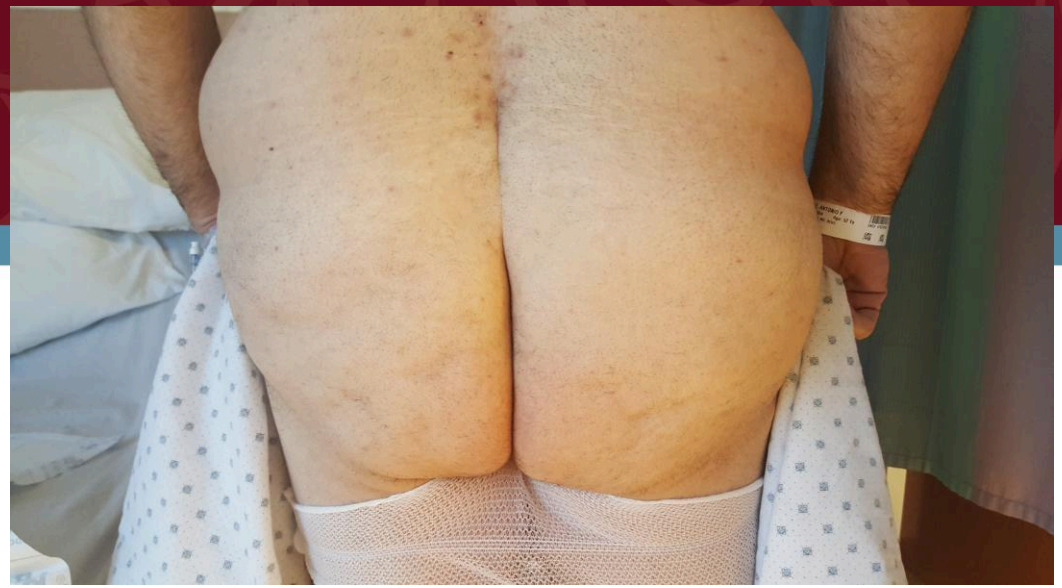
Asking for help is a sign of strength

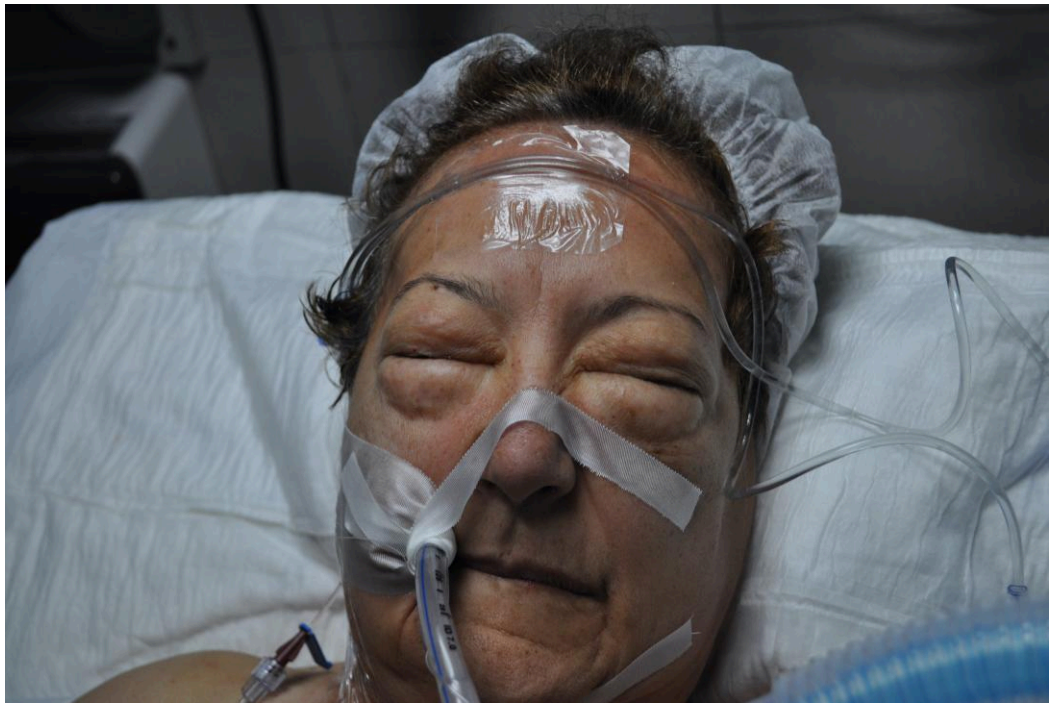
Compartment Syndrome 0.28%

Rhabdomyolysis 0.67- 0.95%

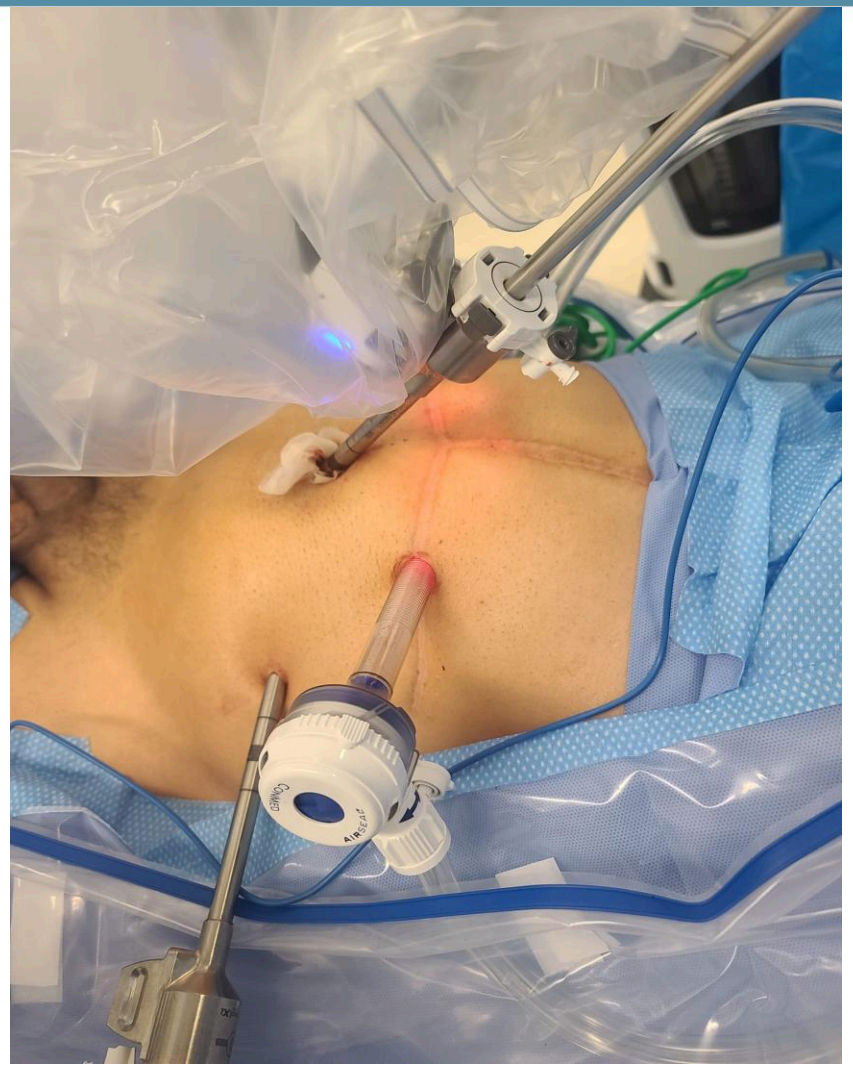
Ischemic Optic Neuropathy 0.05%

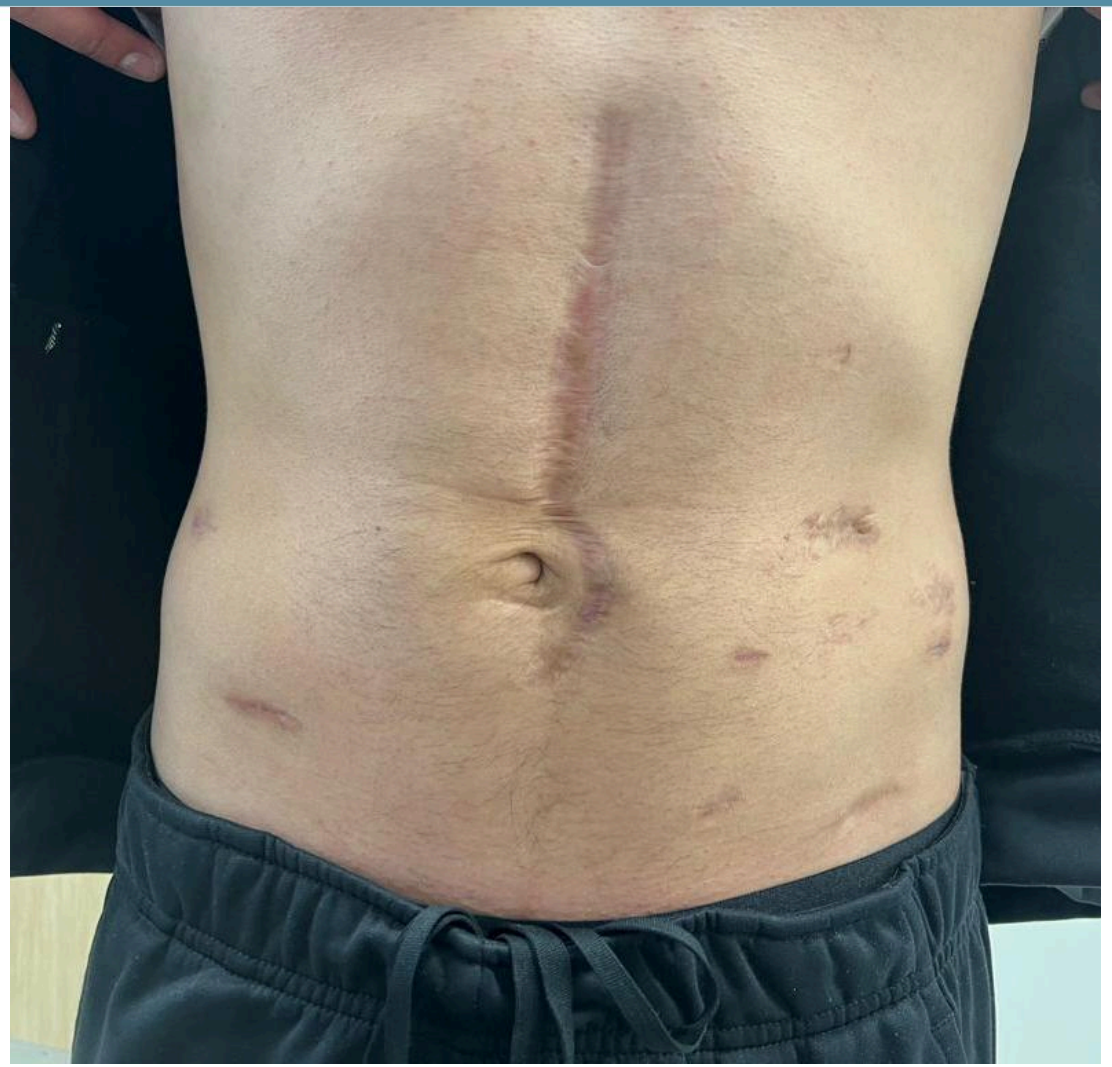




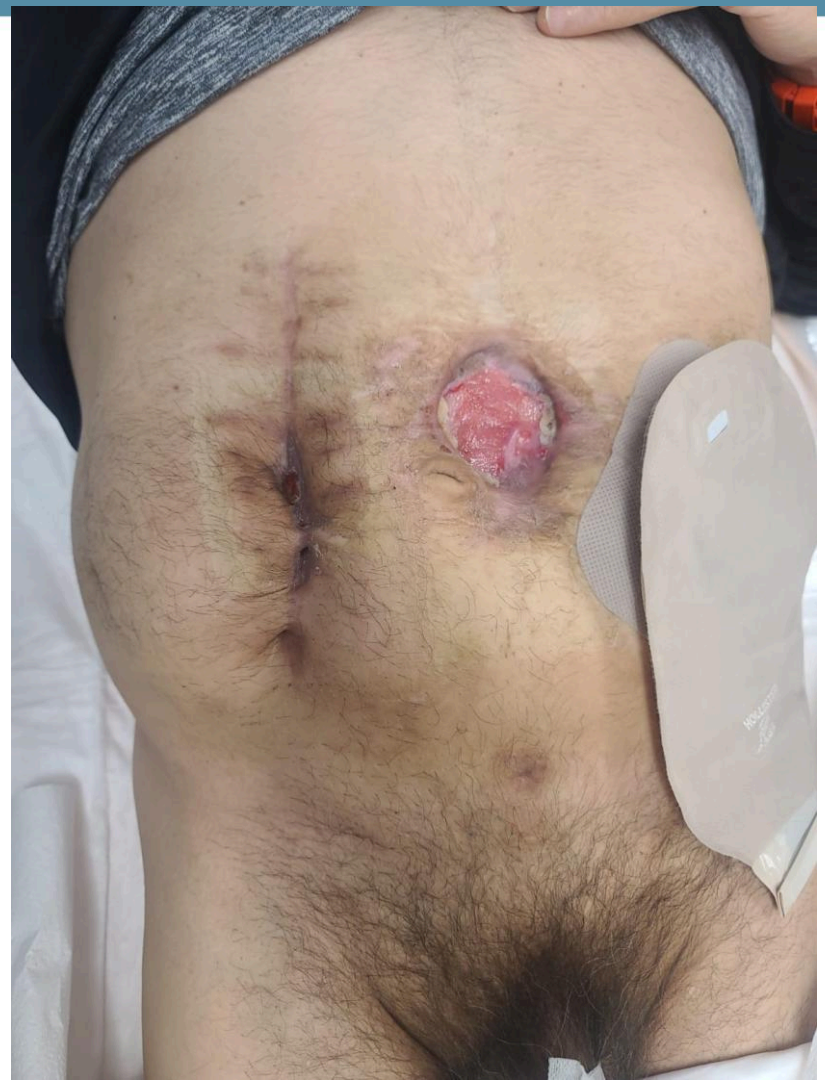


Trocars placement

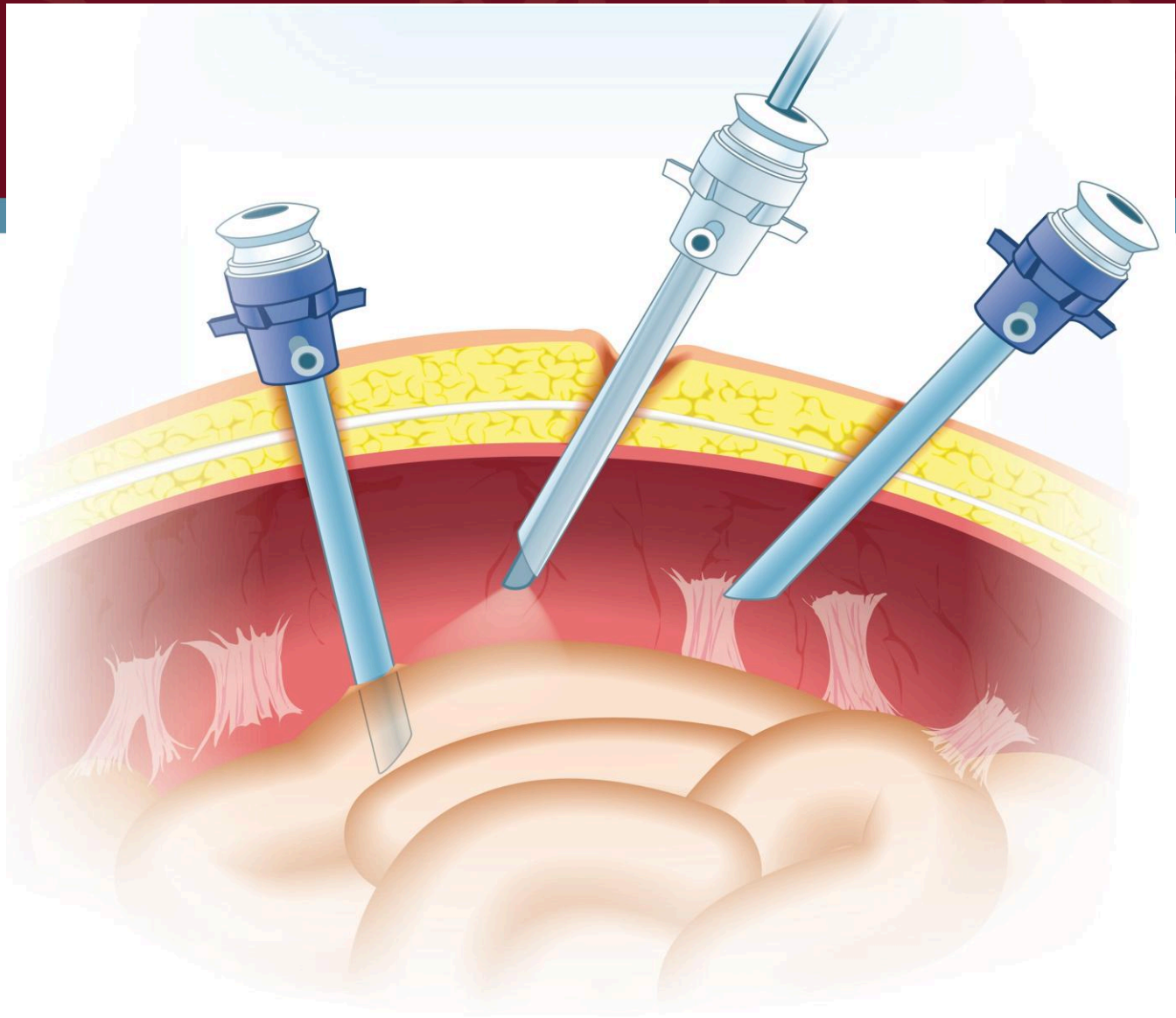




Trocars placement



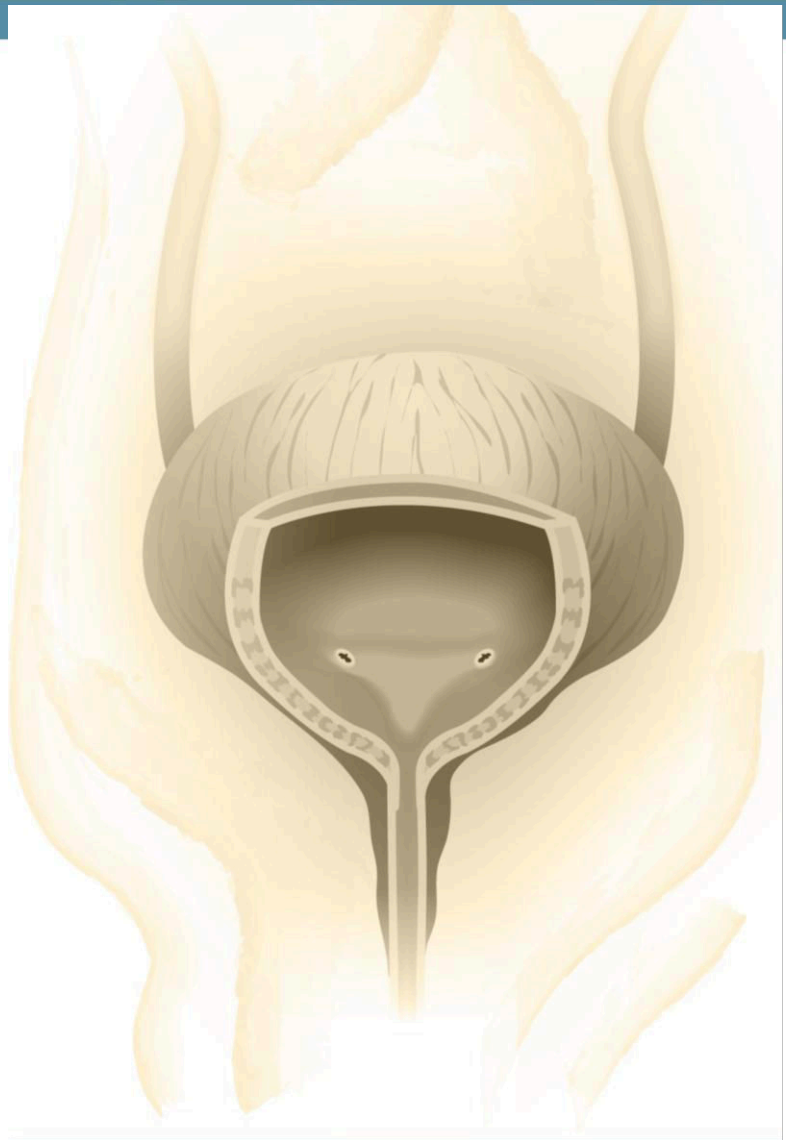
Trocars placement



Hepatic injury

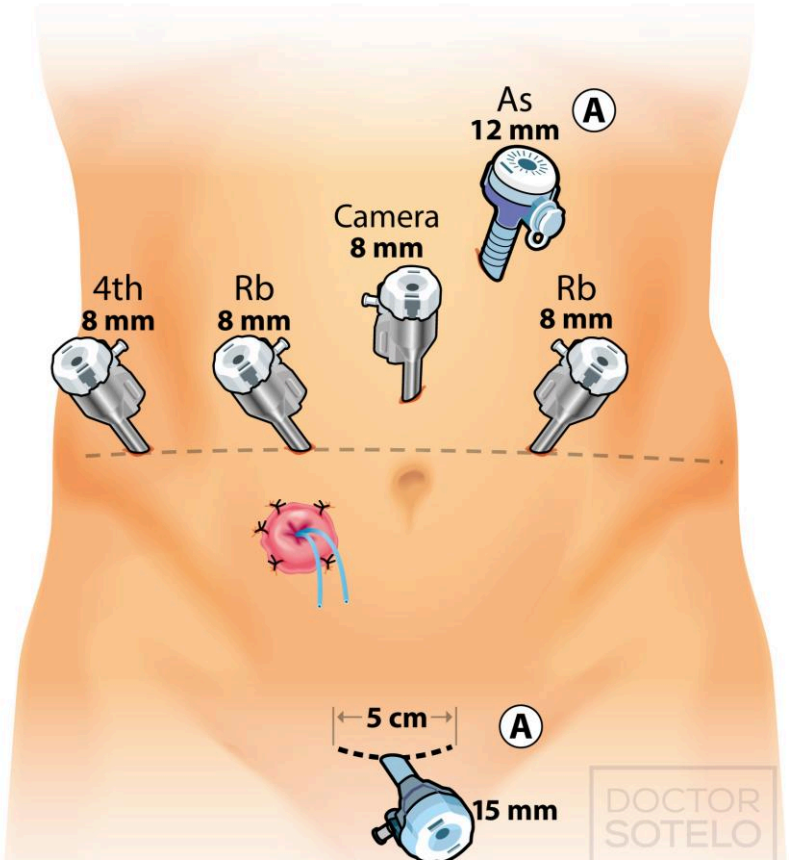
Complications of Robotic Urological Surgery

Bladder

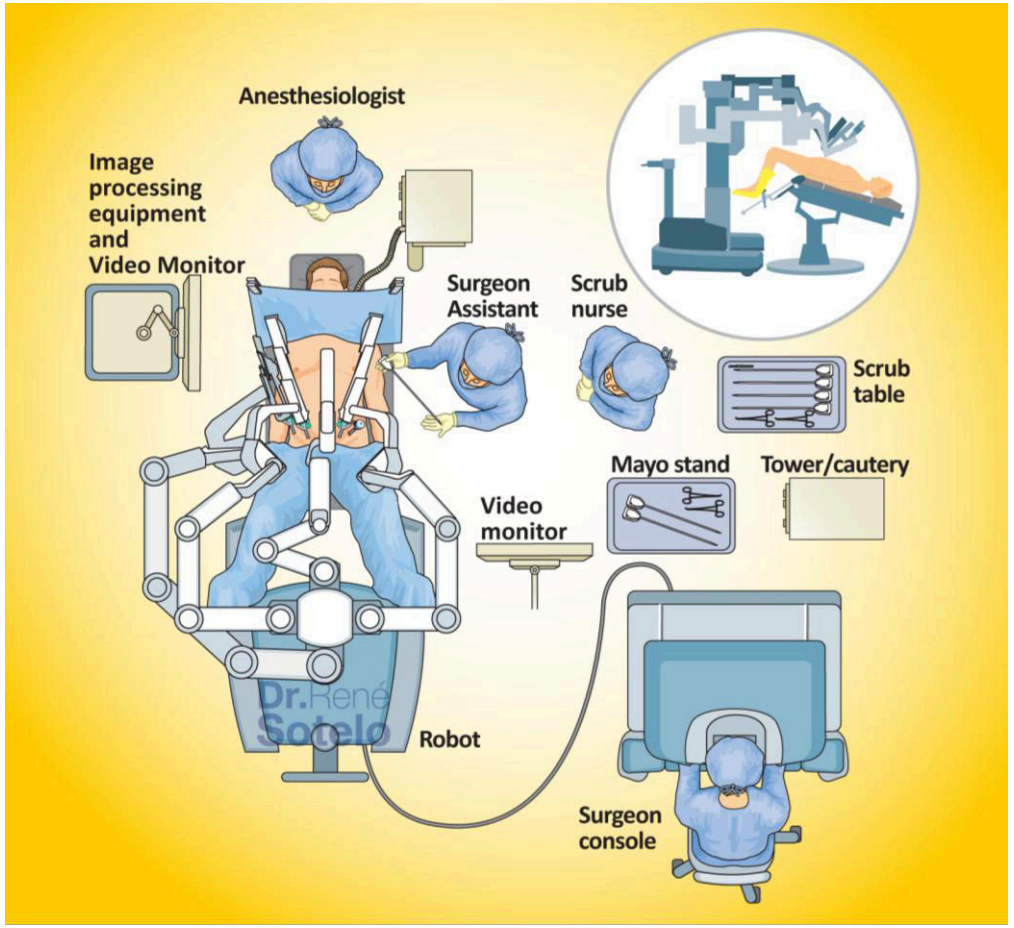


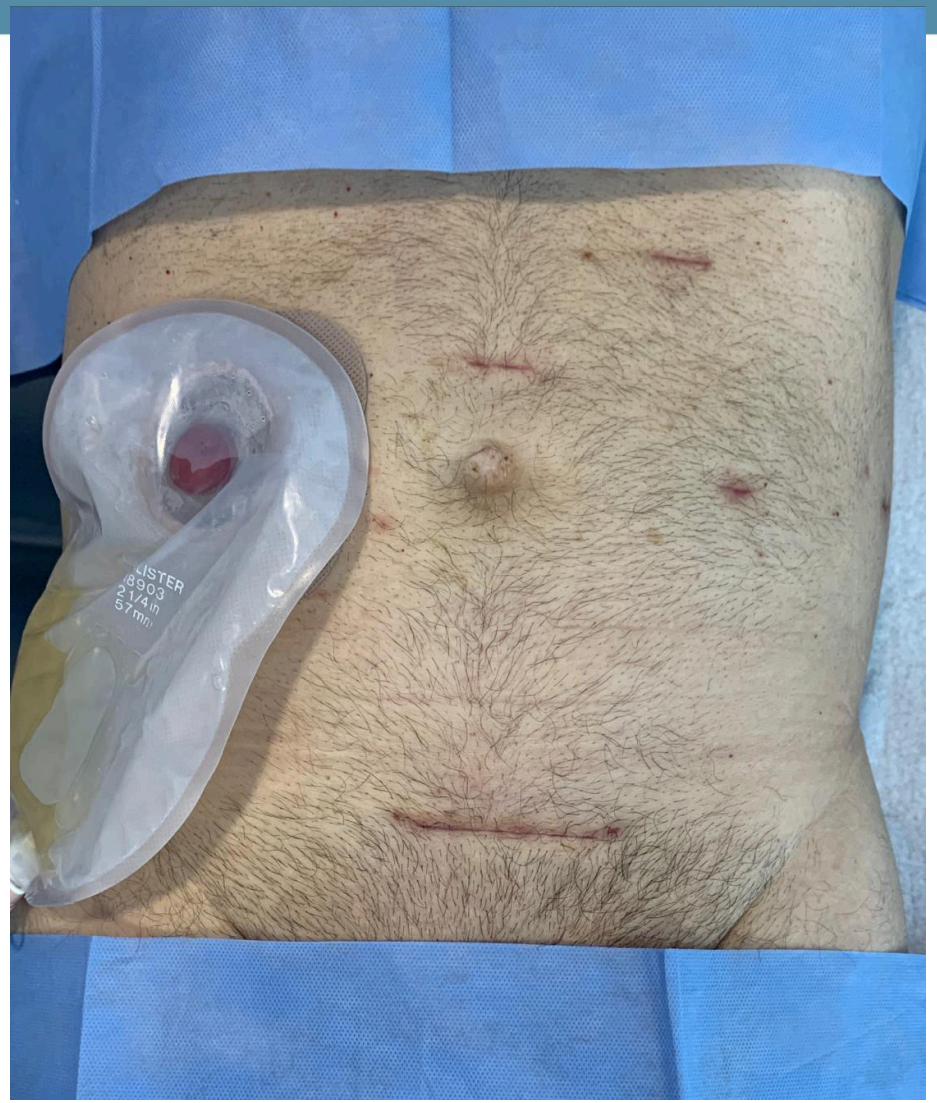
DOCTOR SOTELO

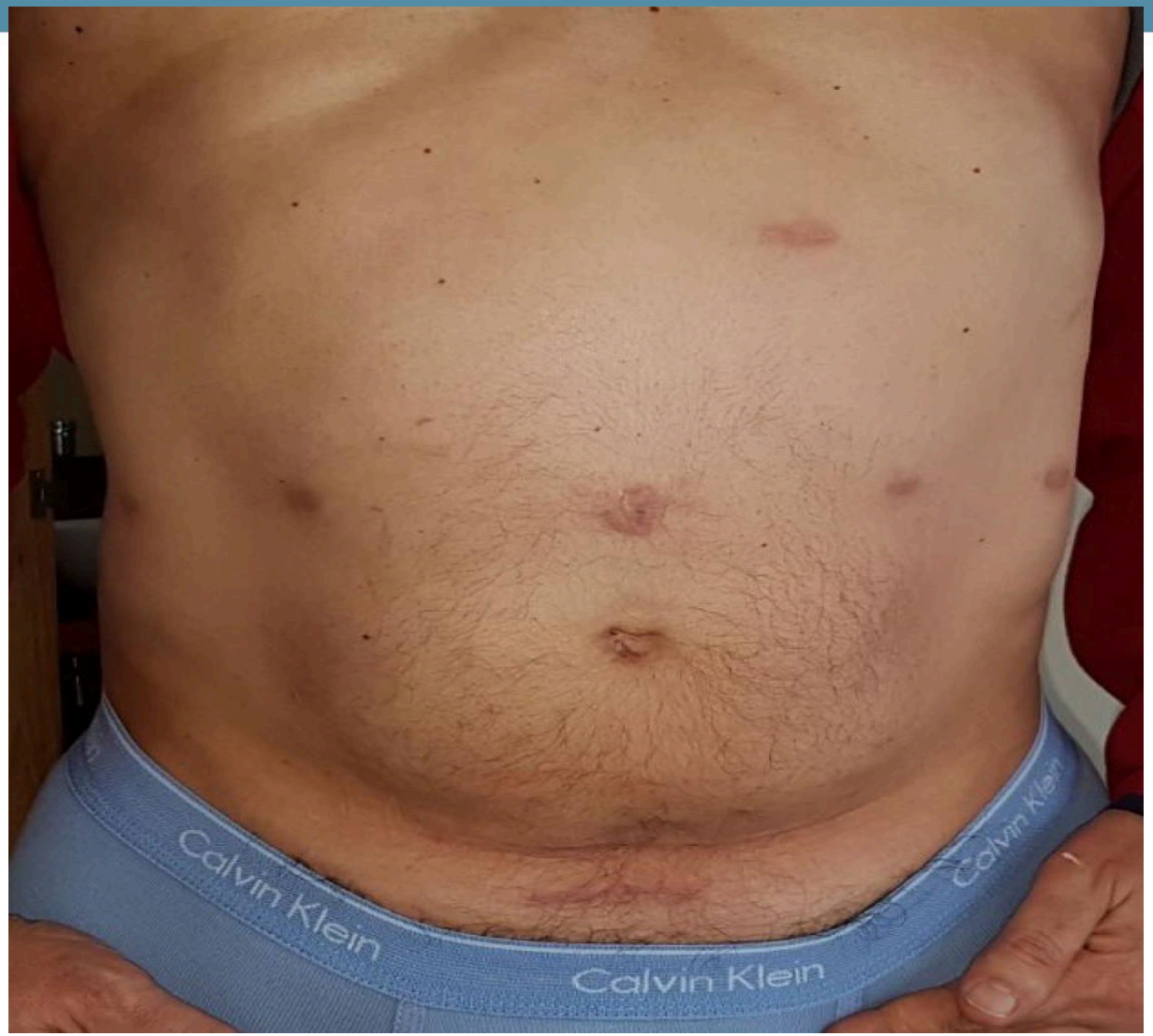
Port placement



Operating room






Calvin Klein
Calvin Klein
Calvin Klein

In female cystectomies, it is important to recognize the correct plane between the vagina and rectum to avoid inadvertent injuries

When unrecognized, this will undoubtedly lead to exploration (open/laparoscopic)

If you are going
to use a sponge-stick…

You need to know where the vagina is!

Must use the Cadiere forceps
to avoid injuries to the small bowel
during preparation and anastomosis

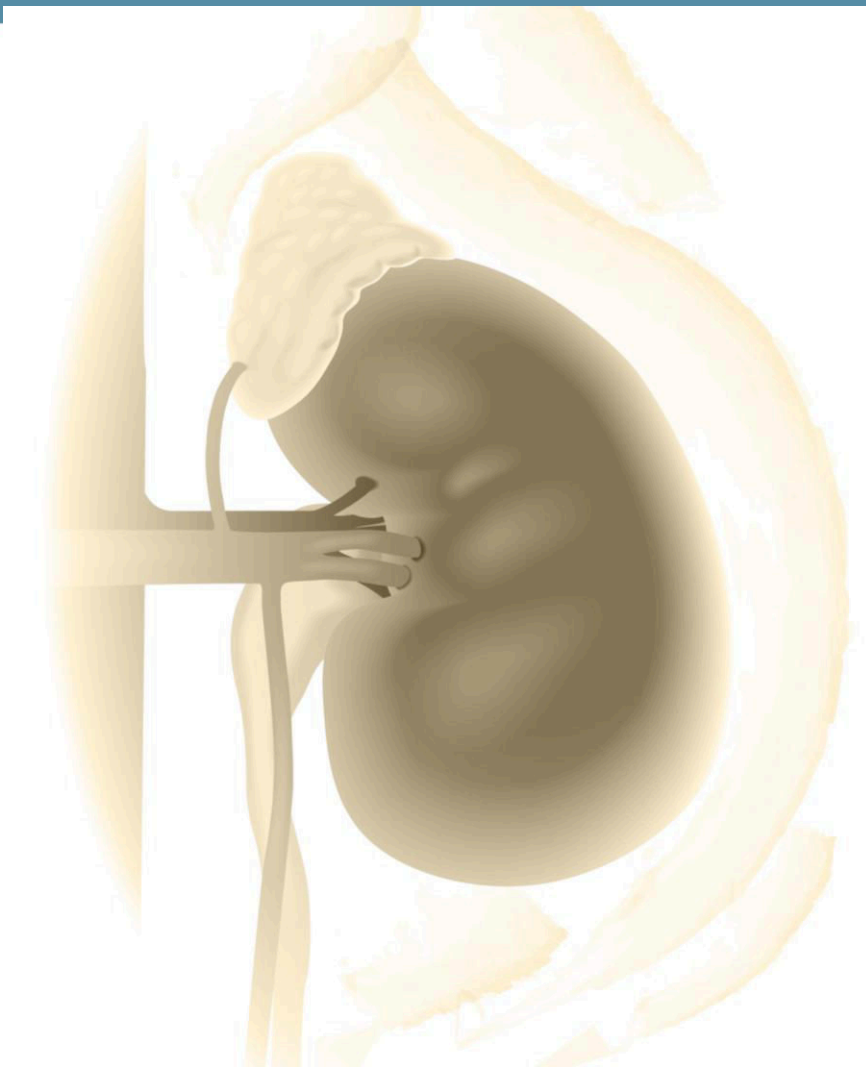
Assess for the location of the ureter and other nearby structures prior to stapling the bowel to avoid accidental injury.

Injury of the right iliac artery,
during the transposition of the left ureter to the right side.

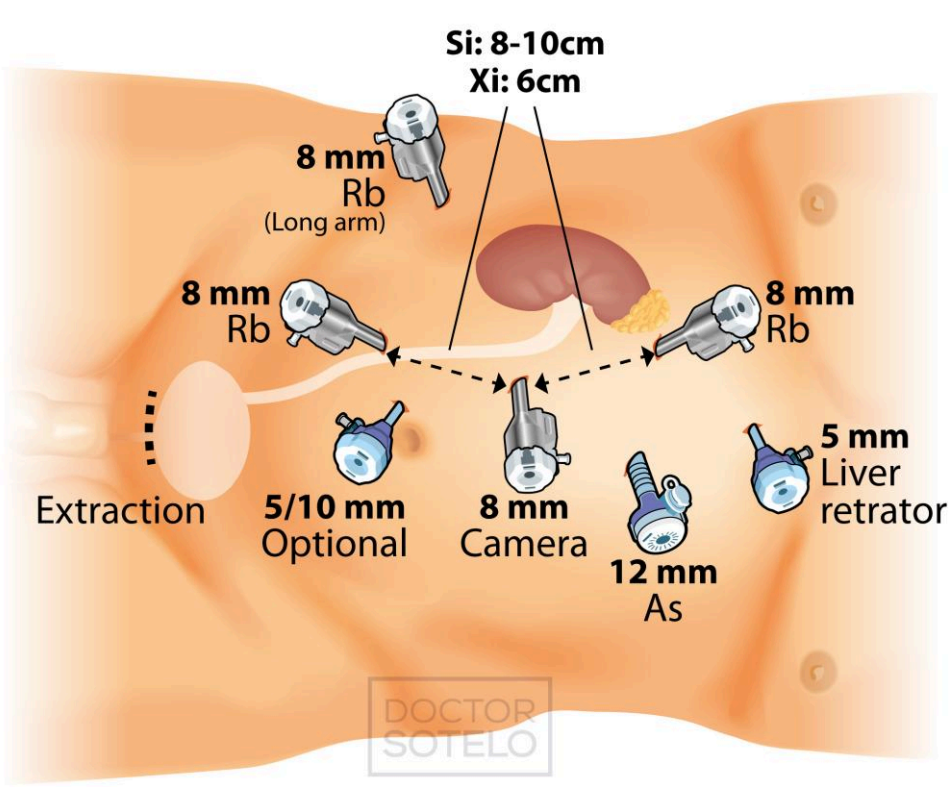
AUA 2026
Washington, DC
MAY 15-18

Complications of Robotic Urological Surgery

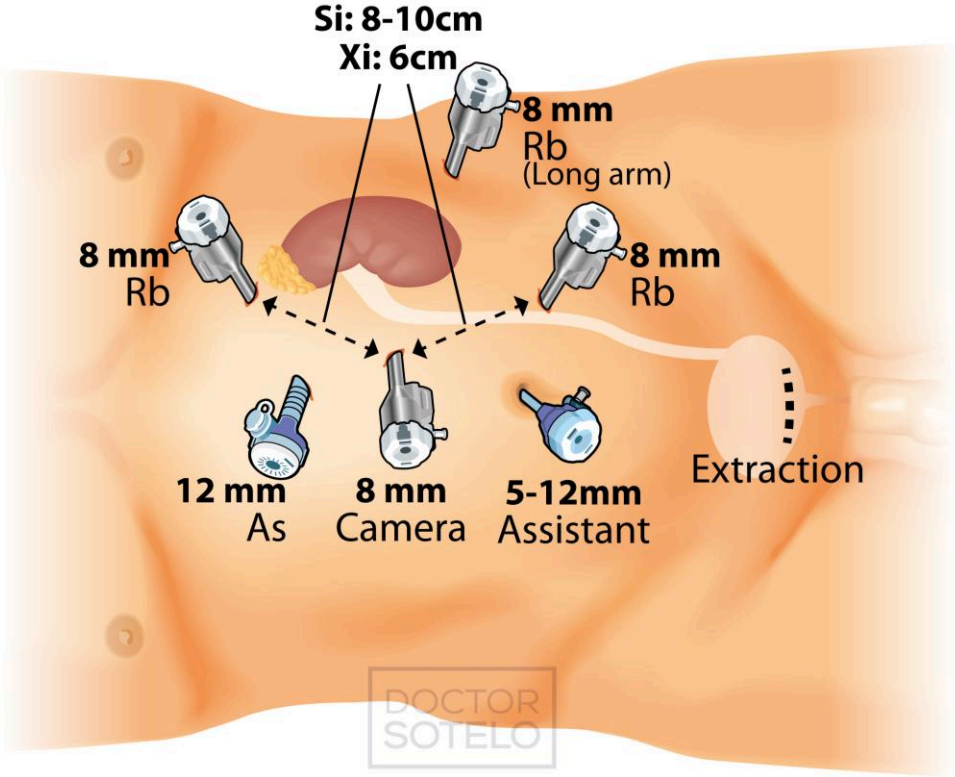
Upper Urinary Tract-Kidney



Right


Si: 8-10cm
Xi: 6cm
8 mm
Rb
(Long arm)
8 mm
Rb
8 mm
Rb
Extraction
5/10 mm
Optional
8 mm
Camera
12 mm
As
5 mm
Liver
retrator
DOCTOR
SOTELO

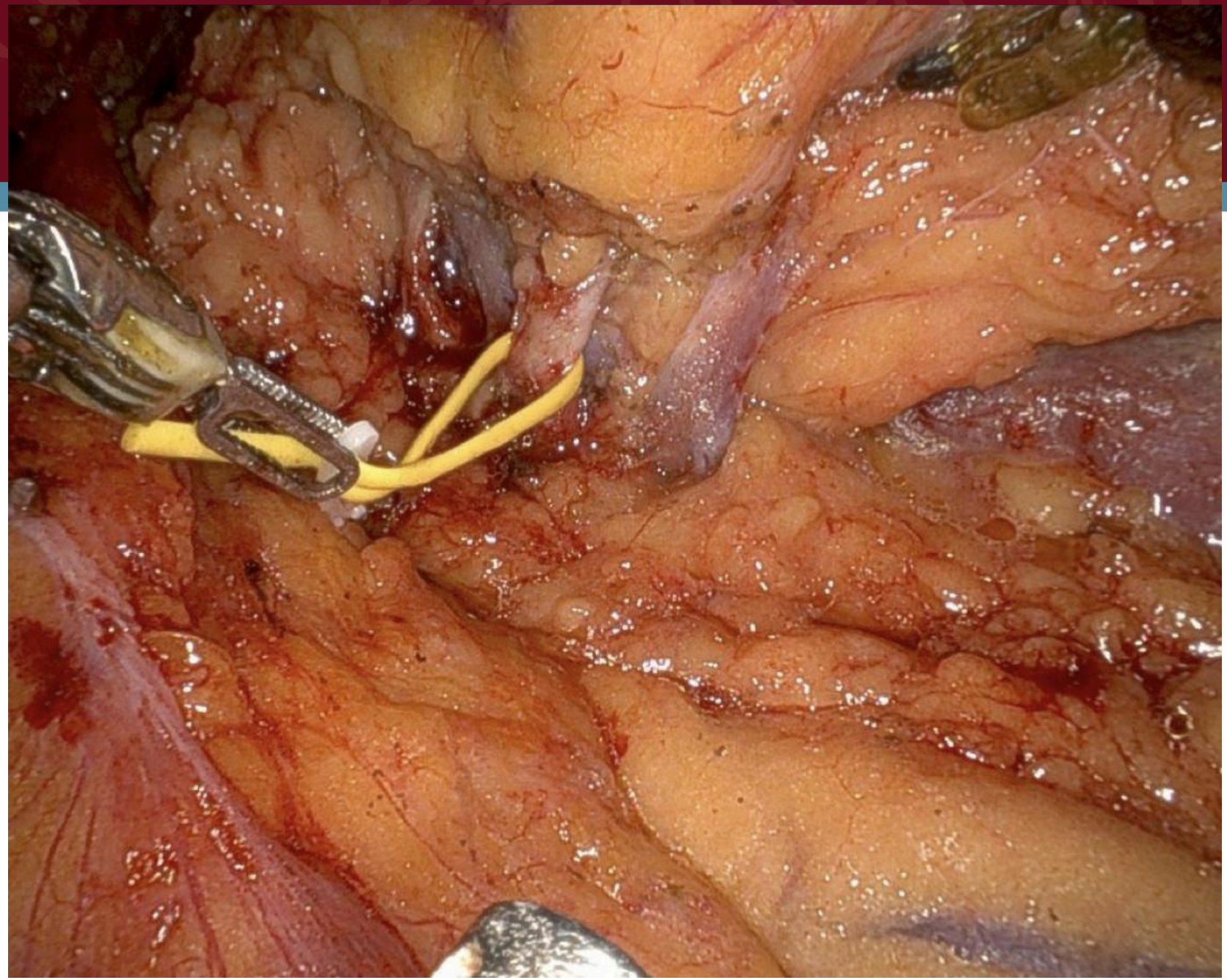
Left

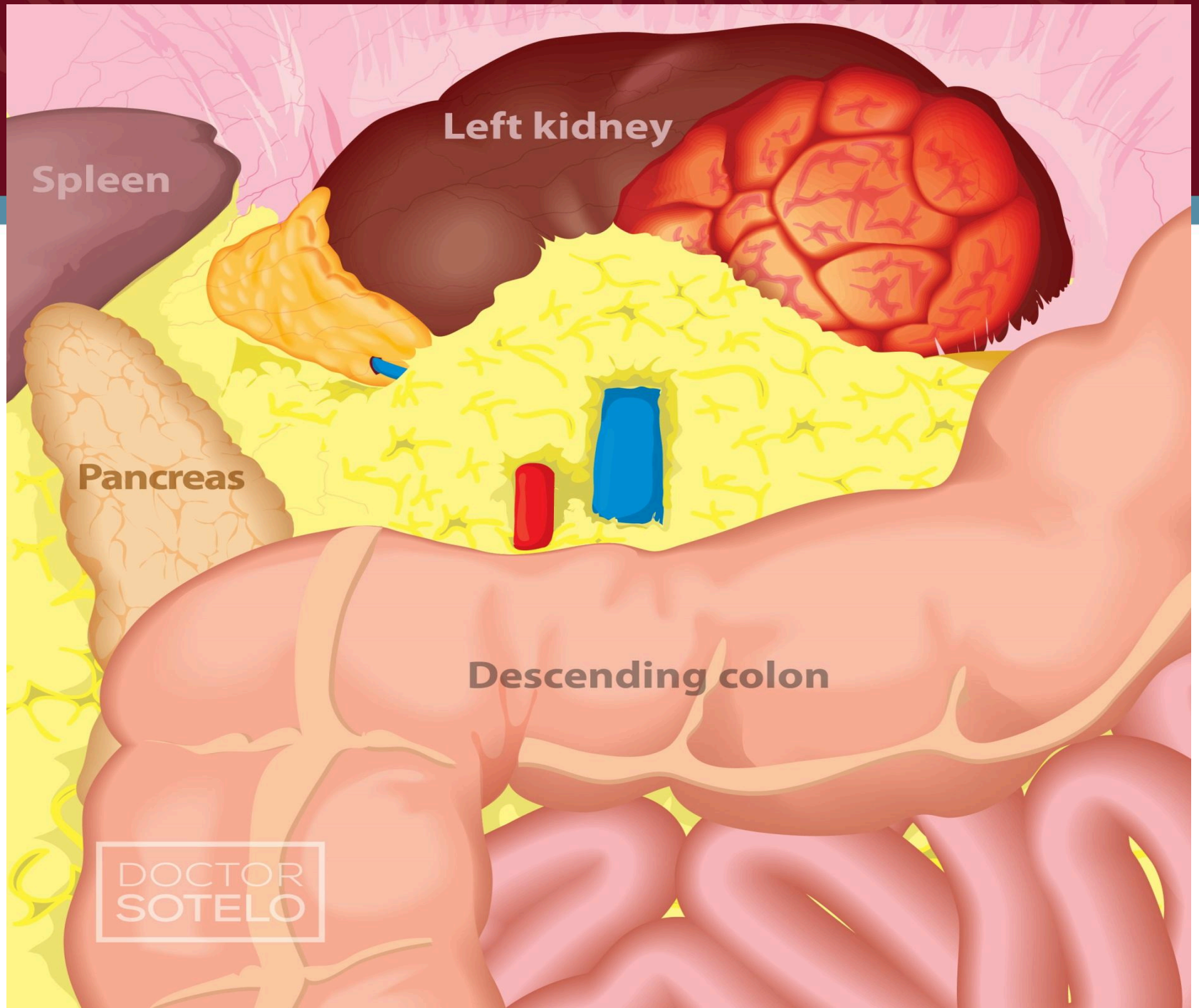

Si: 8-10cm
Xi: 6cm
8 mm
Rb
(Long arm)
8 mm
Rb
8 mm
Rb
12 mm
As
8 mm
Camera
5-12mm
Assistant
Extraction
DOCTOR
SOTELO

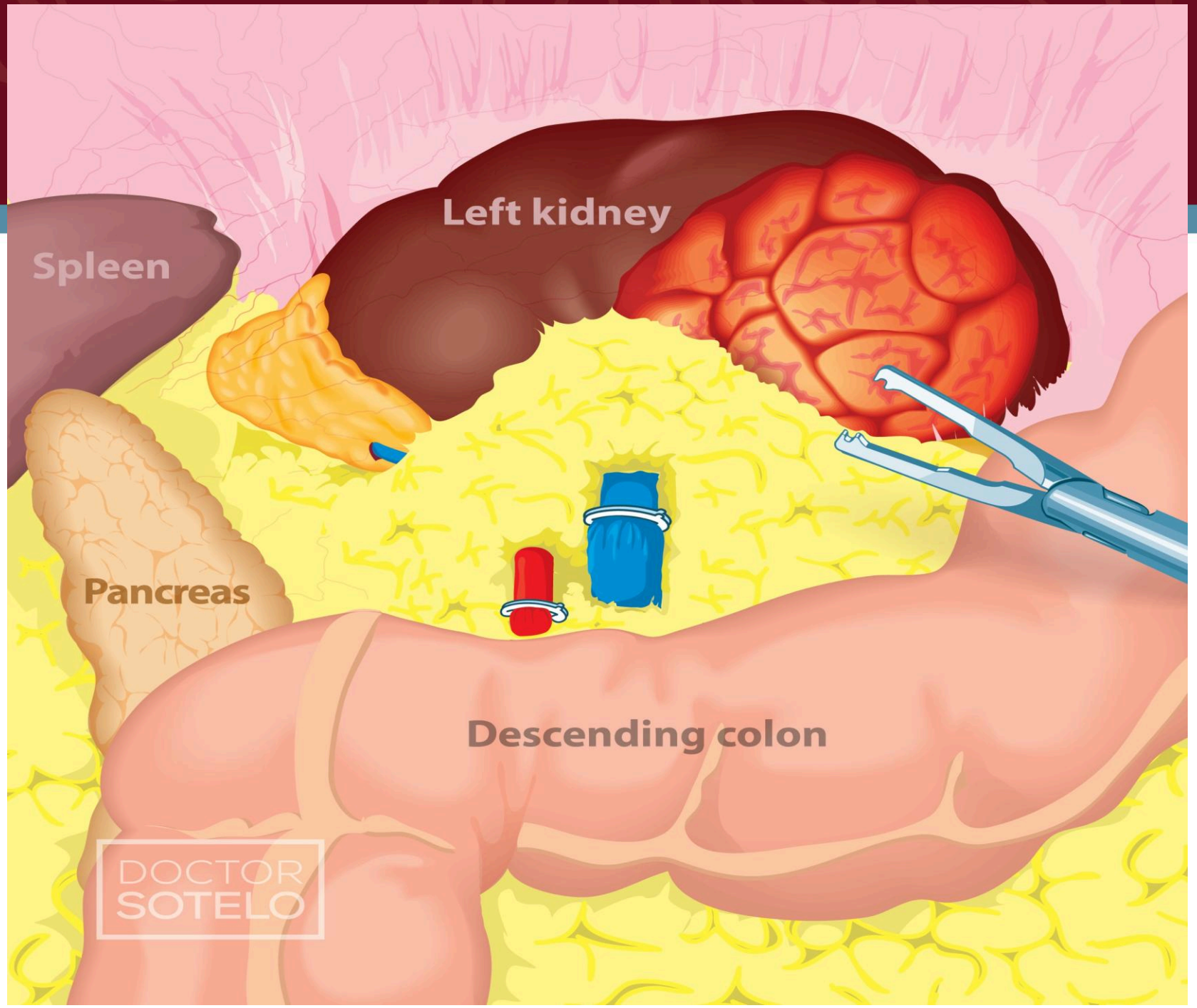
Duodenal injury

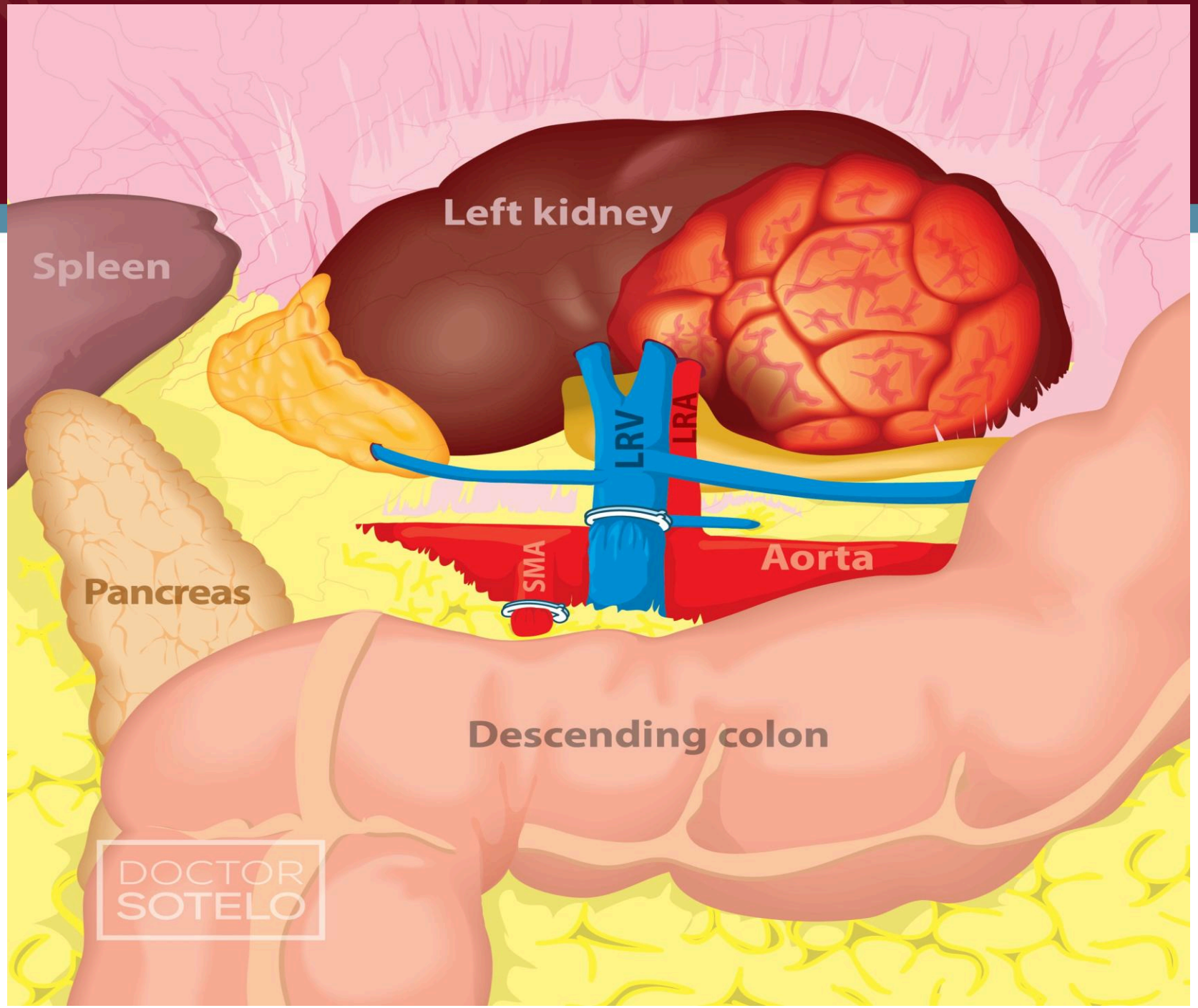
Duodenal injury management options:

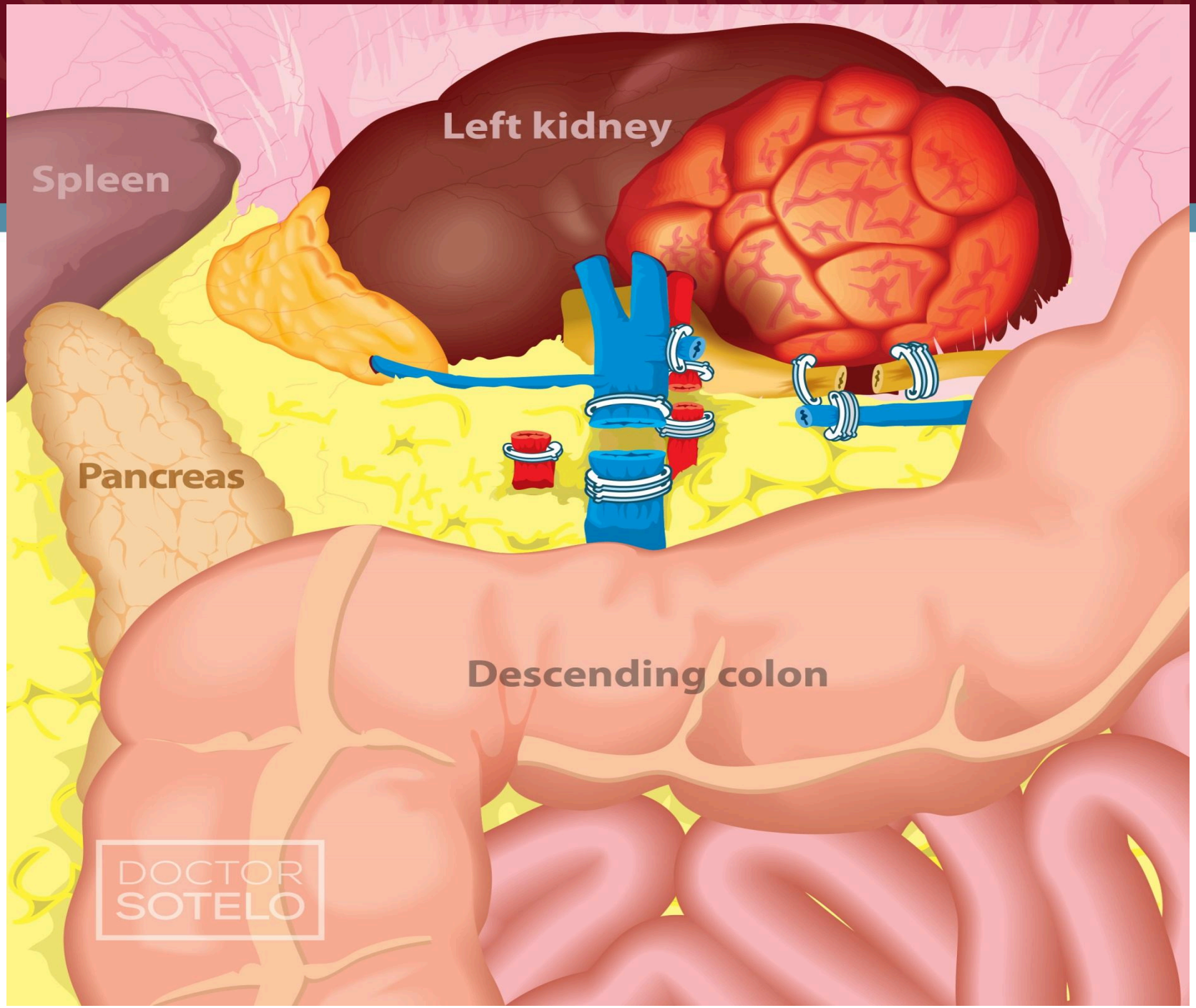
- Primary closure (oriented transversely)
- Primary closure + pyloric exclusion + G-J anastomosis
- Always external drainage for early detection and control of duodenal fistula, 10 days

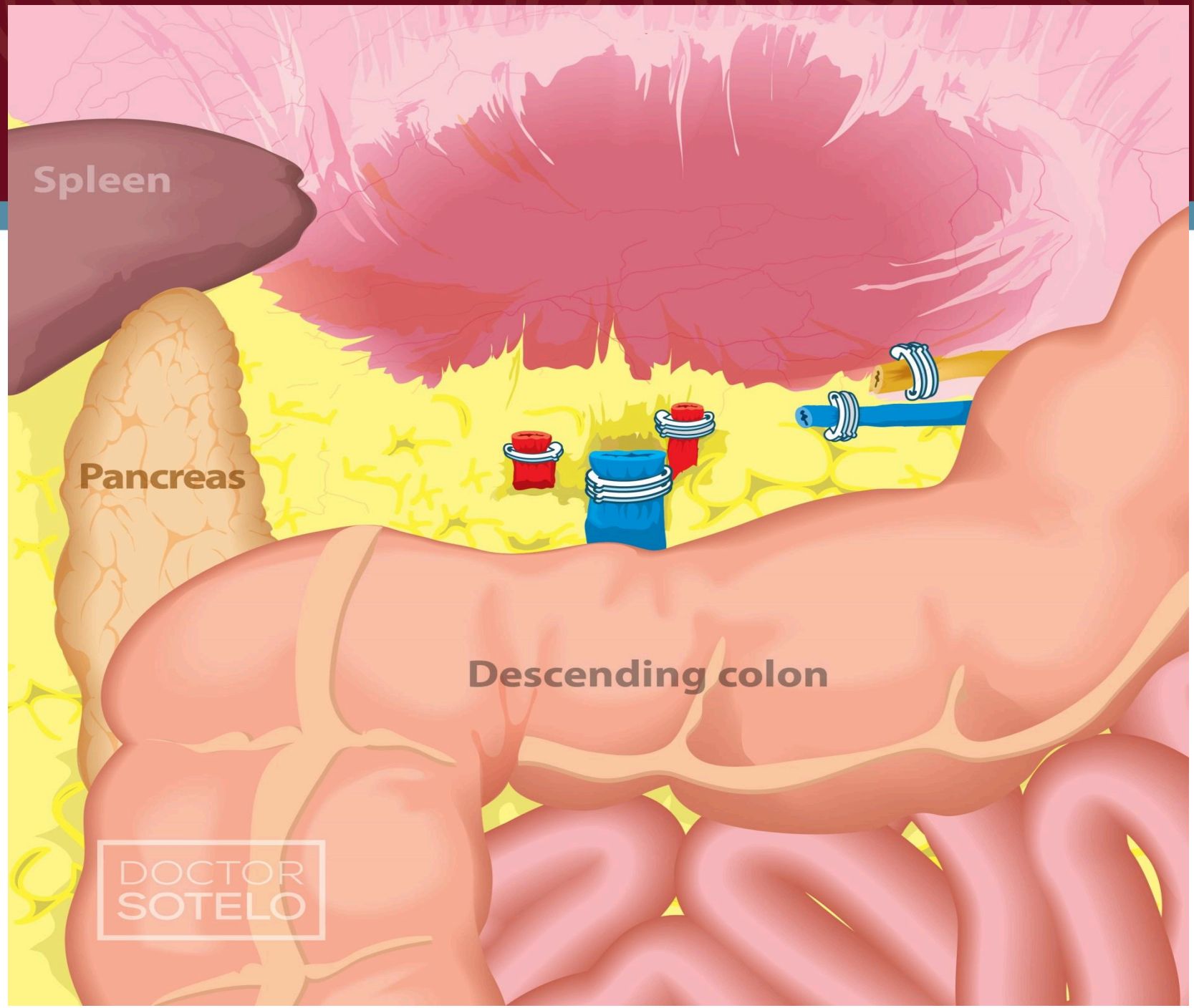


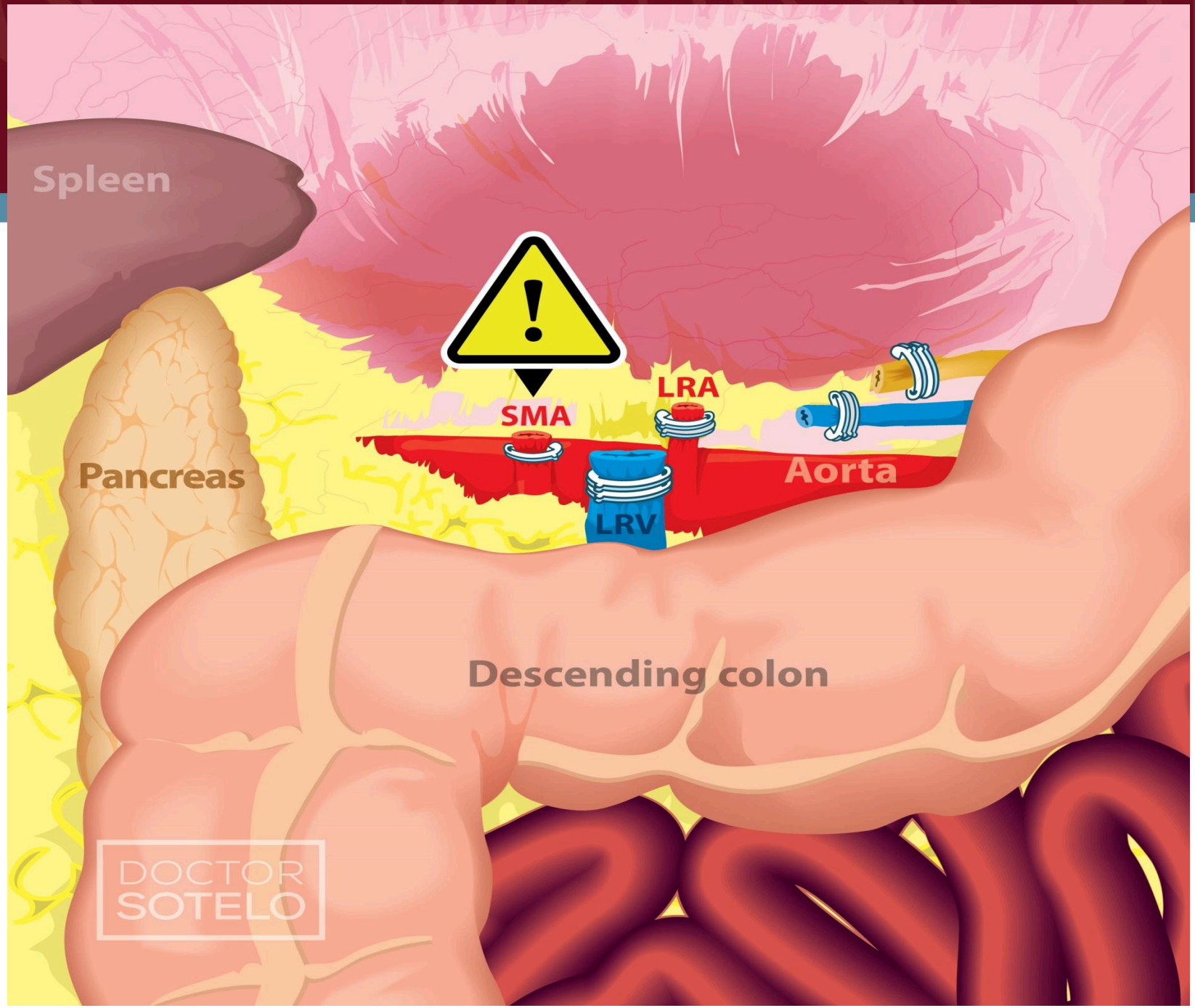

Left kidney
Spleen
Pancreas
Descending colon
DOCTOR
SOTELO

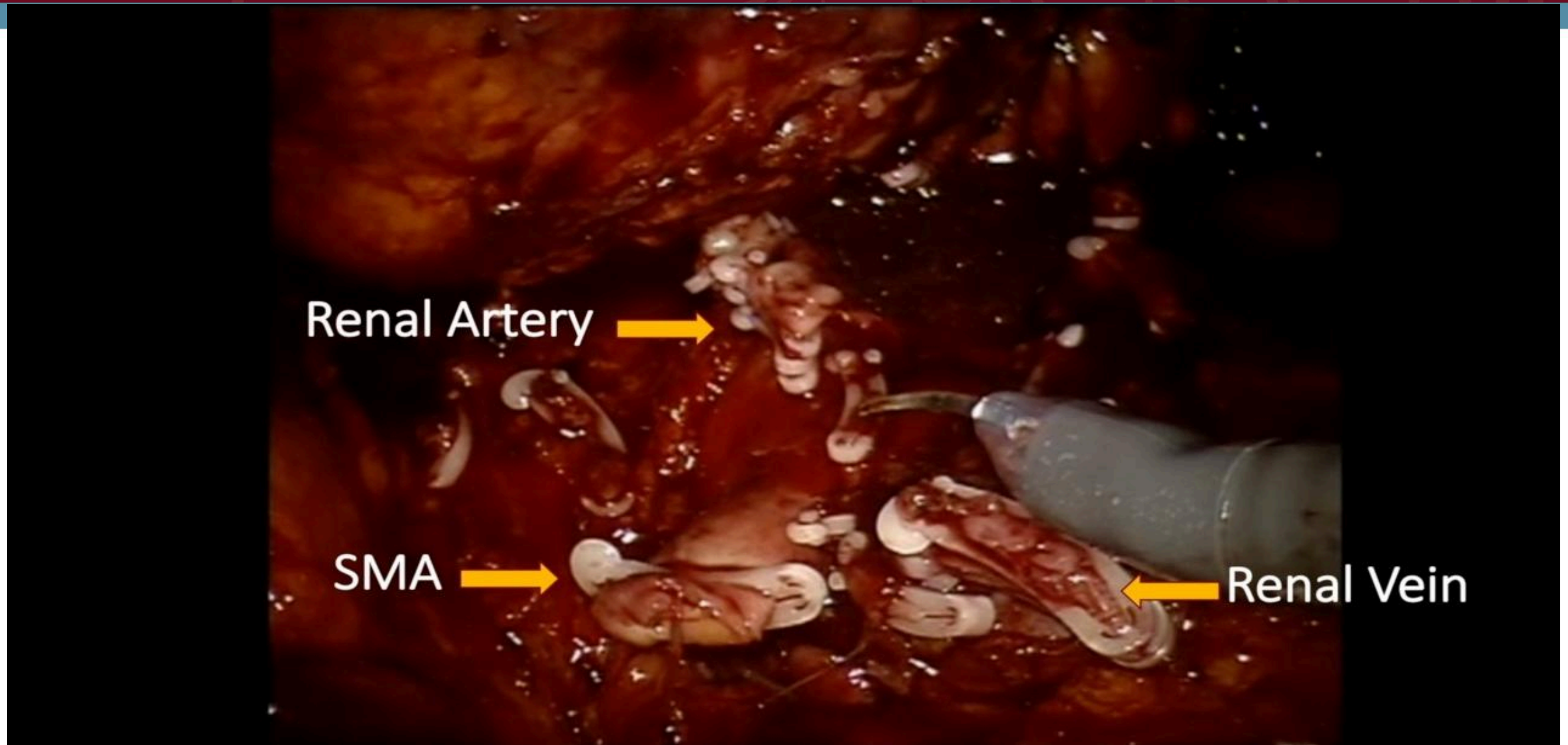

Left kidney
Spleen
Pancreas
Descending colon
DOCTOR
SOTELO


Left kidney
Spleen
LRV
LRA
SMA
Aorta
Pancreas
Descending colon
DOCTOR
SOTELO

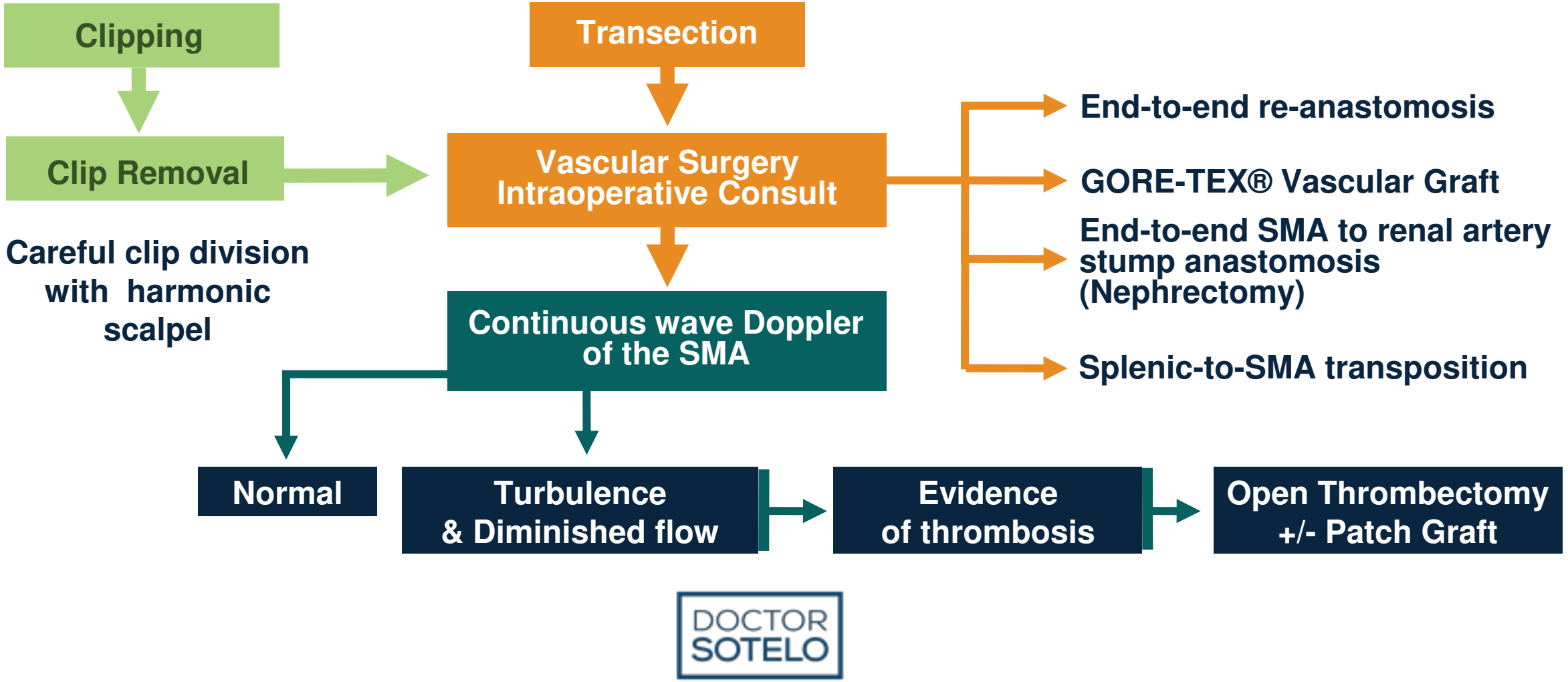

Left kidney
Spleen
Pancreas
Descending colon
DOCTOR
SOTELO


Spleen
Pancreas
Descending colon
DOCTOR
SOTELO


Spleen
Pancreas
SMA
LRA
LRV
Aorta
Descending colon
DOCTOR
SOTELO


Renal Artery
SMA
Renal Vein

SMA Zone I Injury



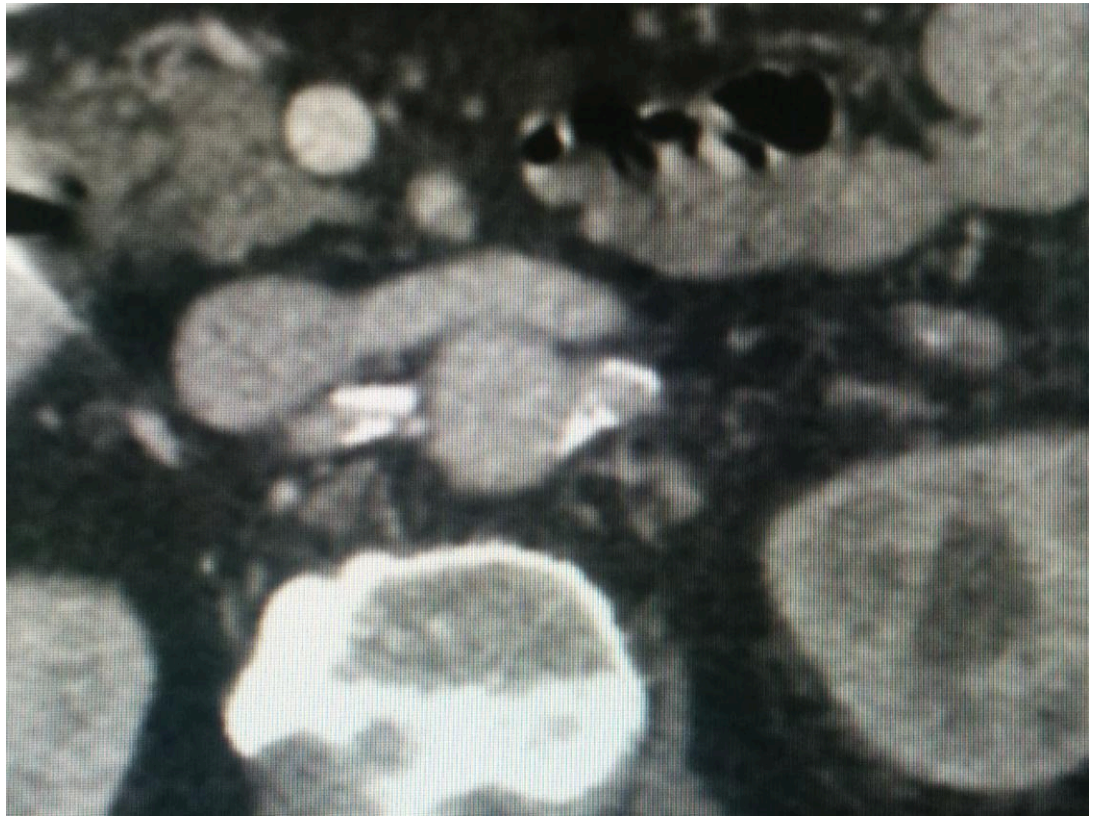
DOCTOR SOTELO

When to Suspect if it is the SMA?

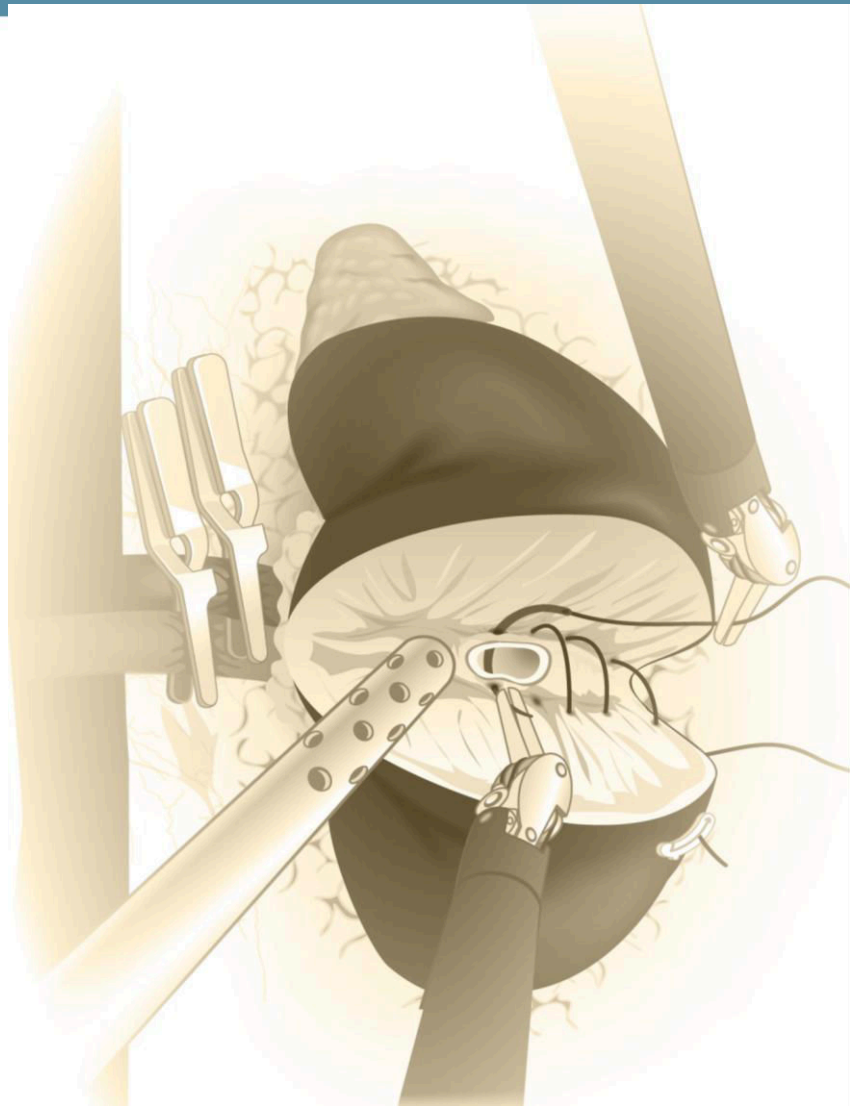
- An artery is identified anterior to the renal vein
  - An artery has an atypical lie (transverse)
  - An artery is medial to the Abdominal Aorta
- More than one large artery encountered, not previously seen on CT

TIP

It is recommended to follow the artery in its full trajectory to confirm if it enters the kidney



Complications during Partial Nephrectomy



Ureteral injury

Ureteral injury

Tumor Spillage

Bleeding during the resection

Tips & Tricks
for Successful SP - Nephrectomy

4. Assistant Port Utilization

Determine the necessity
and placement of additional assistant ports to aid in the procedure.

Stapler , Clip Applier, Bulldogs

Robotic partial nephrectomy

Lower pole artery injury

Robotic partial nephrectomy

Renal vein injury

Mount Sinai

Debriefing

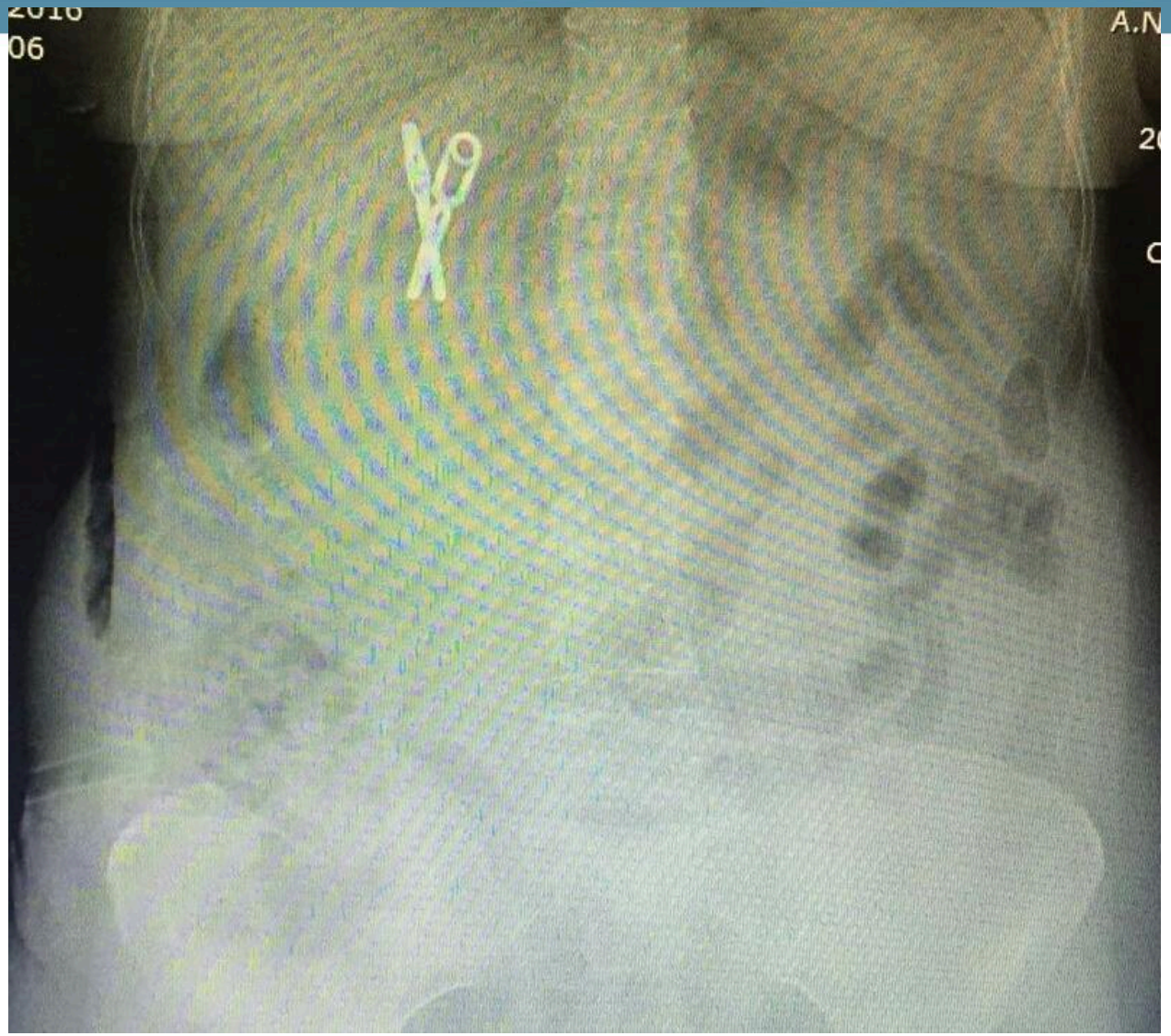
Reduced field of view under the instrument

- Always ensure that you are observing what is behind the instruments or outside your field of vision

- Take the extra time to make a safe dissection that allows visualization, especially close to vascular structures

Quick reaction

Missing bulldog clamp after surgery



Lessons Learned

- Do not sacrifice good surgical technique (even small tumors can bleed excessively)
- Dissect the renal hilar vessels (always)
- Hemostatic adjuncts (FloSeal, Avitene, Surgicel) are helpful, but NOT in the setting of acute hemorrhage

Technical Modifications Over Time

EUROPEAN UROLOGY 57 (2010) 138–144

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Endo-urology

NOTES Hybrid Transvaginal Radical Nephrectomy for Tumor: Stepwise Progression Toward a First Successful Clinical Case

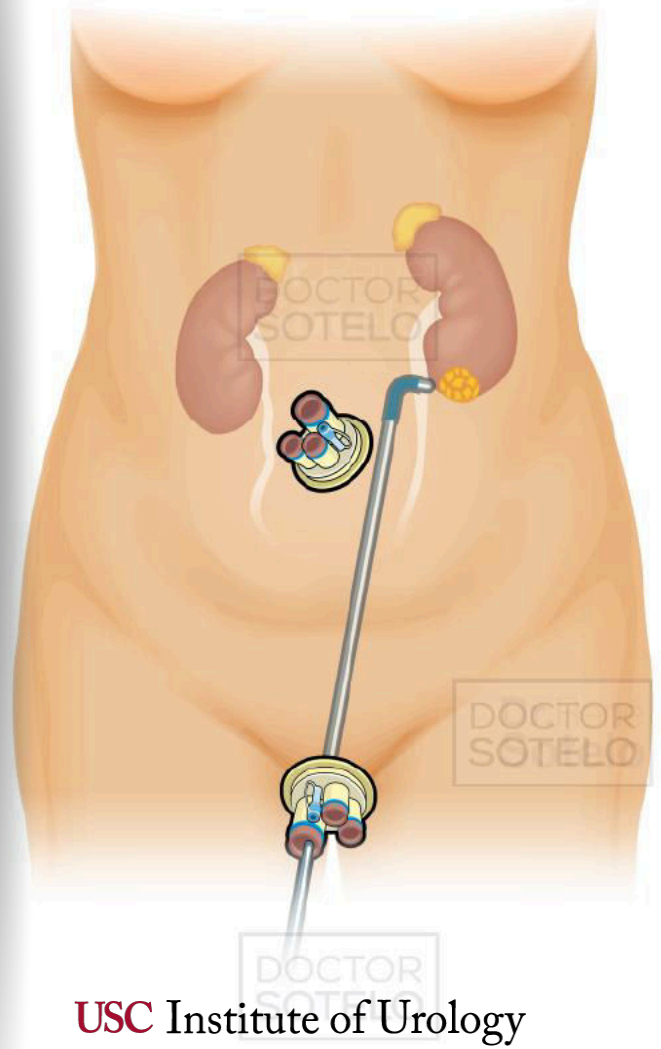
Rene Sotelo [a,], Robert de Andrade [a], Golena Fernández [a], Daniel Ramirez [a], Eugenio Di Grazia [a], Oswaldo Carmona [a], Otto Moreira [a], Andre Berger [b], Monish Aron [b], Mihir M. Desai [b], Inderbir S. Gill [b]*

[a] *Centro de Robótica y De Invasión Mínima Unidad de Urología, Instituto Médico La Floresta, Caracas, Venezuela*
[b] *Cleveland Clinic, Cleveland, OH, USA*

March 2009
- Tumor lower pole left kidney

Abdominal trocars:
- Umbilical Three-channel R- port (Triport)

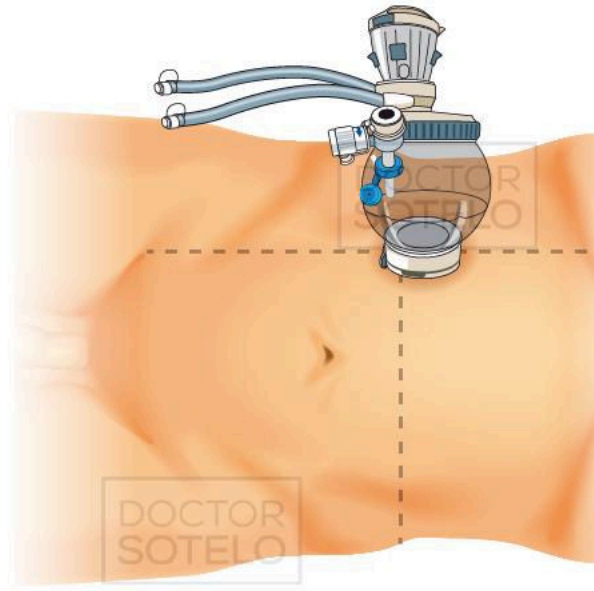
Vaginal Access:
- Three-channel R port (Triport)
- Deflectable tip camera Endo EYE 5 mm.

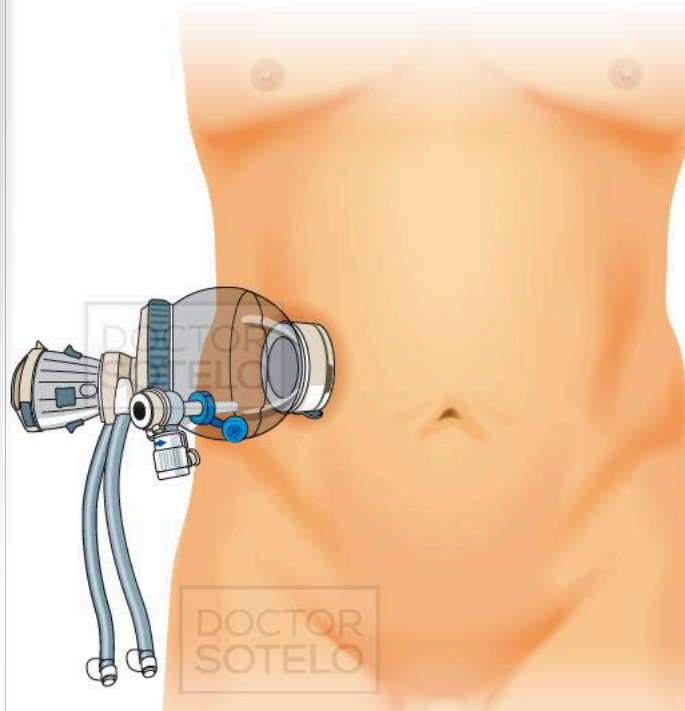


USC Institute of Urology
Keck Medicine of USC

Overview of SP - Nephrectomy

Single port nephrectomy involves performing kidney removal through a single incision, reducing invasiveness and enhancing post operative recovery.





Moschovas MC, Bhat S, Rogers T, Onol F, Roof S, Mazzone E, et al. Technical Modifications Necessary to Implement the da Vinci Single-Port Robotic System. Eur Urol. 2020;78(4):563–570. https://doi.org/10.1016/j.eururo.2020.01

USC Institute of Urology
Keck Medicine of USC

Tips & Tricks
for Successful SP - Nephrectomy

5. Hilar Dissection Techniques

Develop effective methods for exposing and controlling the renal hilum during surgery.

SP TROUBLES and HOW TO "SHOOT" THEM

TROUBLE	REASON	SHOOTING
INSTRUMENT EXCHANGE	FLOATING DOCK – RELOC/ADJ	IN THE SP ACCESS PORT BOWL
CAMERA CLEAN	FLOATING DOCK – RELOC/ADJ	CAMERA CONTROL/ASSISTANT
INSTRUMENT RESISTANCE	FLOATING DOCK – RELOC/ADJ	ASSISTANT
TRACTION	RELOCATION	TRACTION UP
INSTRUMENTS/CAMERA CONFLICTS	FLEXIBLE CAMERA	NAVIGATOR
NO REACHING	LENGTH OF PLATFORM	ASSISTANT BURP IN
NO ASSISTANCE	N/A	FLEX SUCTION, 3 INSTR, CAM CONTROL
BLEEDING	N/A	3RD INSTRUMENT AND add +1

Courtesy of: Simone Crivellaro, MD, MHA

Bleeding

One More Time, Lessons Learned

Tips & Tricks

for Successful - low anterior access Nephrectomy

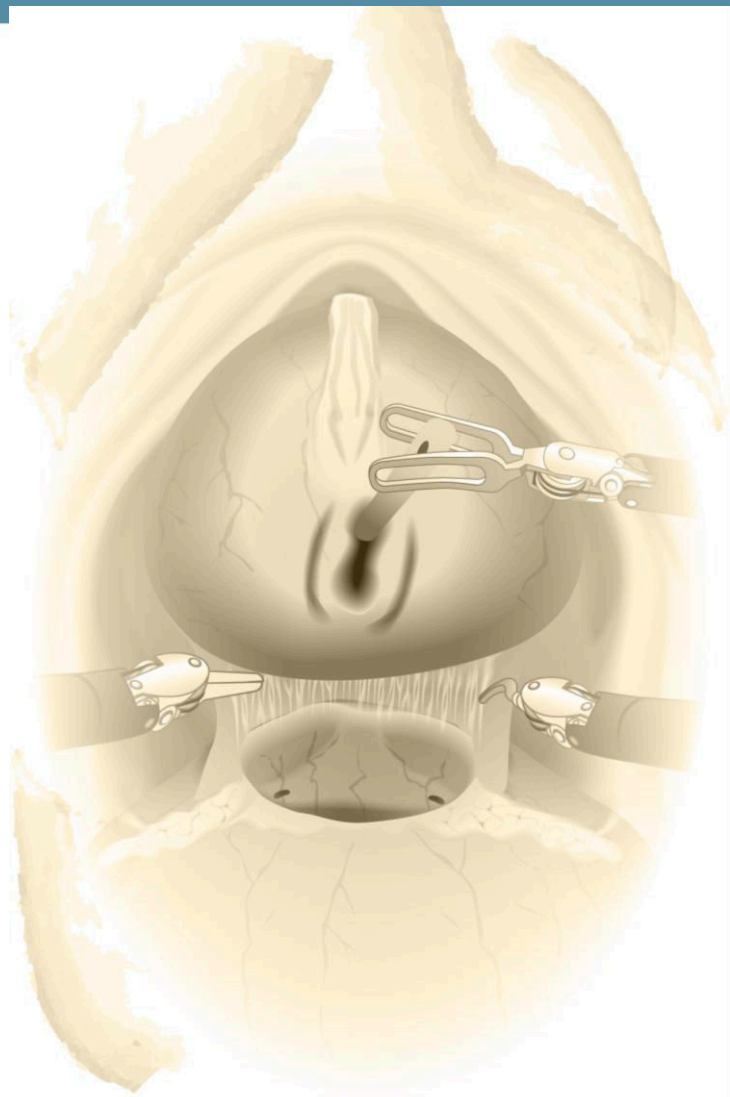
Peritoneotomy

USC Institute of Urology
Keck Medicine of USC

AUA 2026
Washington, DC
MAY 15-18

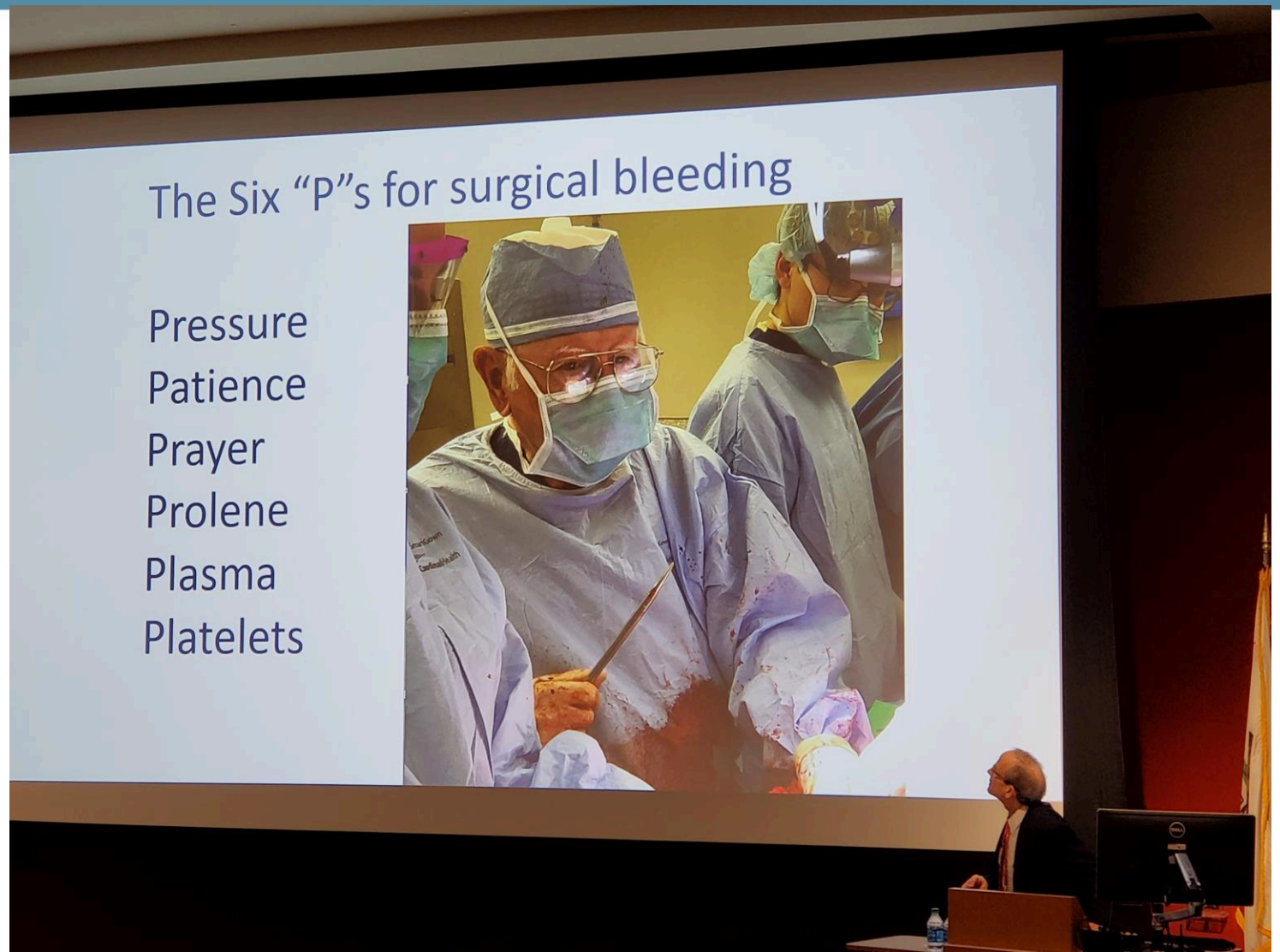
Complications of Robotic Urological Surgery

Lower Urinary Tract- Prostate



Inadequate anatomical identification

Sequential Compression Device (SCD)


The Six "P"s for surgical bleeding
Pressure
Patience
Prayer
Prolene
Plasma
Platelets

Clip failing off internal artery branch

Recognition and Management

- Compression
  - Increase pneumoperitoneum to 20 mmHg
    - Rolled gauze sponge to tamponade, grasp arterial stump
    - Needle drivers, rescue suture
    - Improve Exposure (enlarging and “clearing” the operative field)
- Careful suction
  - Venous bleeding increases with loss of pneumoperitoneum

Recognition and Management

- Make a quick decision whether robotic/laparoscopic repair is possible
- Additional ports
- Convert to open if necessary…
  do not let ego get in the way

Hemorrhage Tray: Contents

- 8-10 cm suture prepared with a Lapra-Ty or Hem-o-Lok clip at the end.
- Lapra-Ty and clip appliers and Hem-o-Lok clips and applier
- 2 needle holders
- Klein bulldogs + Klein applicator
- Satinsky
- Surgicel
- Bolsters
- 4-0 silk on CV needle and 2-0 suture on CT-1

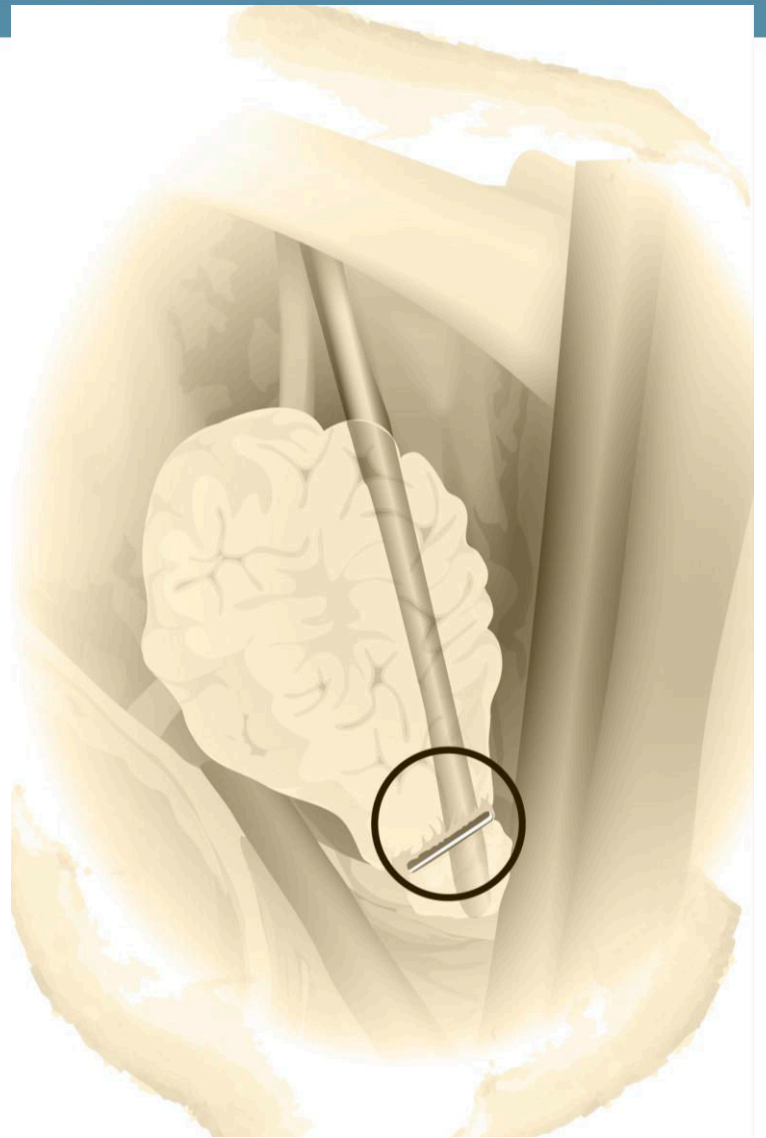
Prevention

- Accept that complications can occur at EVERY step
- Become familiar with intracorporeal suturing to gain vascular control if needed

Conclusions

- Keep in mind that this catastrophe can in fact occur
- Dermatologist's don´t have major vascular injuries
- Timely conversion of laparoscopy is not a source of shame but a sign of wisdom.

Nerve Injury



Nerve Injury

- **Nerve injuries are rare during laparoscopic surgery**

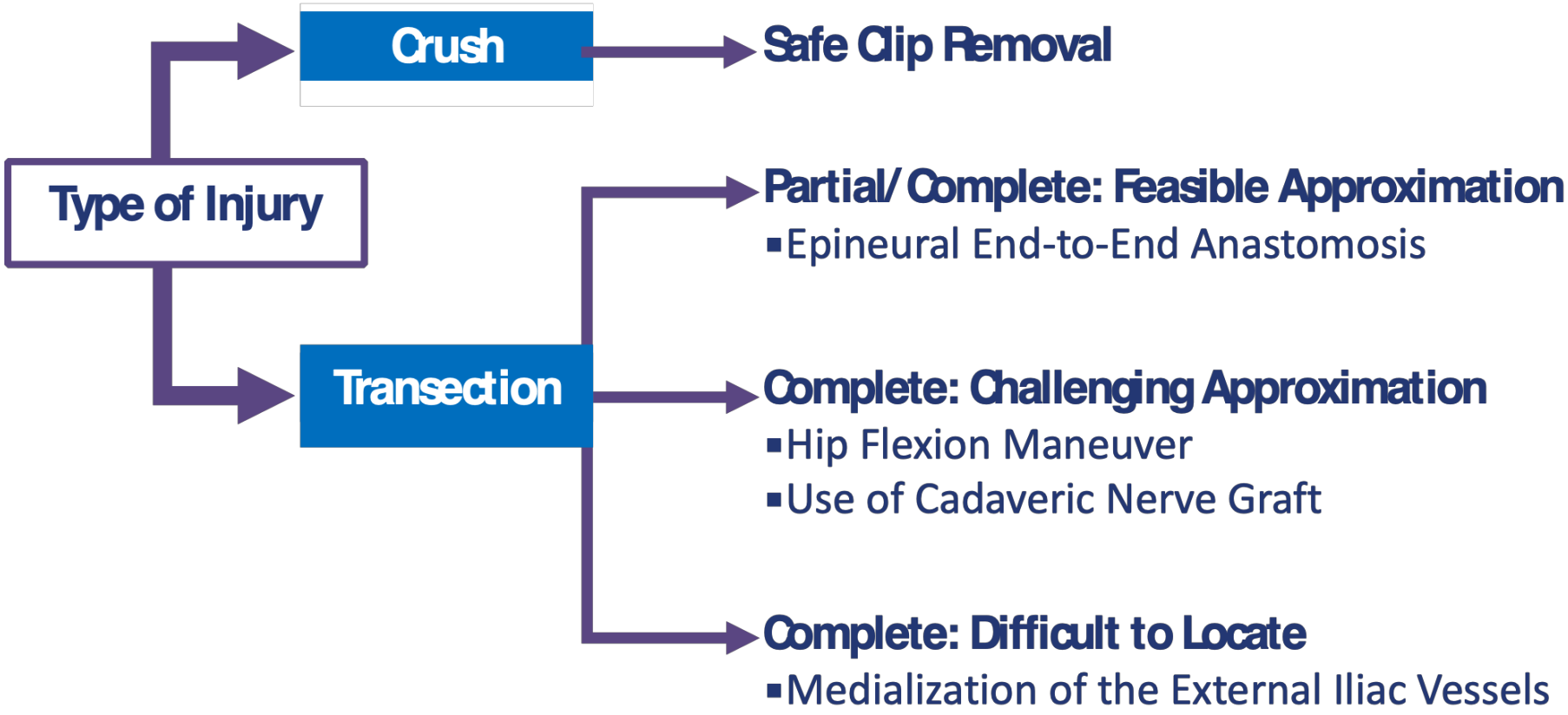
- **Nerve damage during pelvic surgery: branches of lumbosacral plexus**

Iliohypogastric, ilioinguinal, genitofemoral, lateral femoral cutaneous, femoral, ***obturator****, pudendal, sciatic*

Obturator nerve

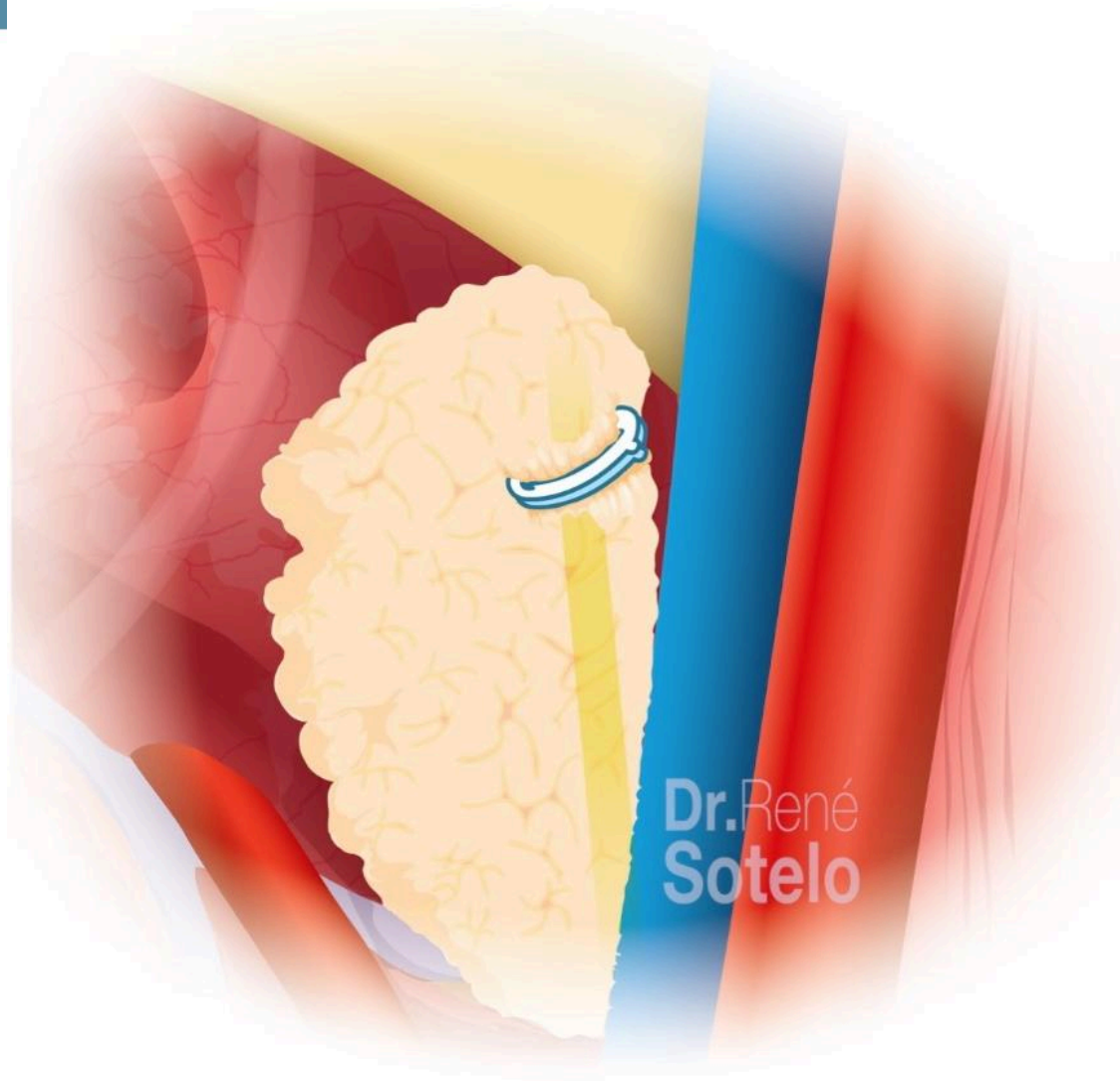
- Anatomical location is very predictable and reproducible
- Knowledge of anatomy is the key to preventing injury
- Types of injury: stretch, thermal, ligation, transection
- If transected, should attempt to align both ends and suture repair

Classification & Management



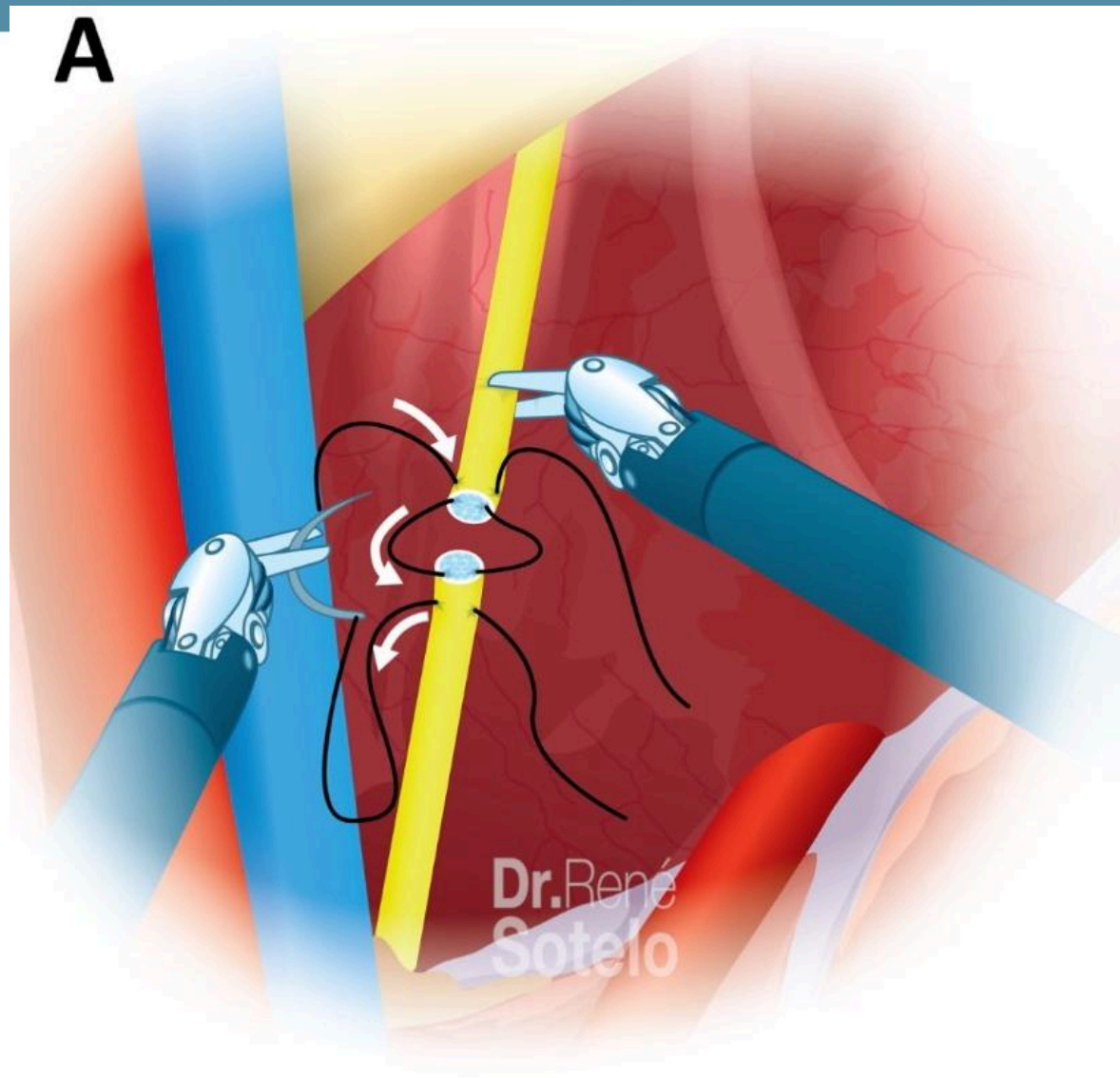
Obturator Nerve Injury:

Crush



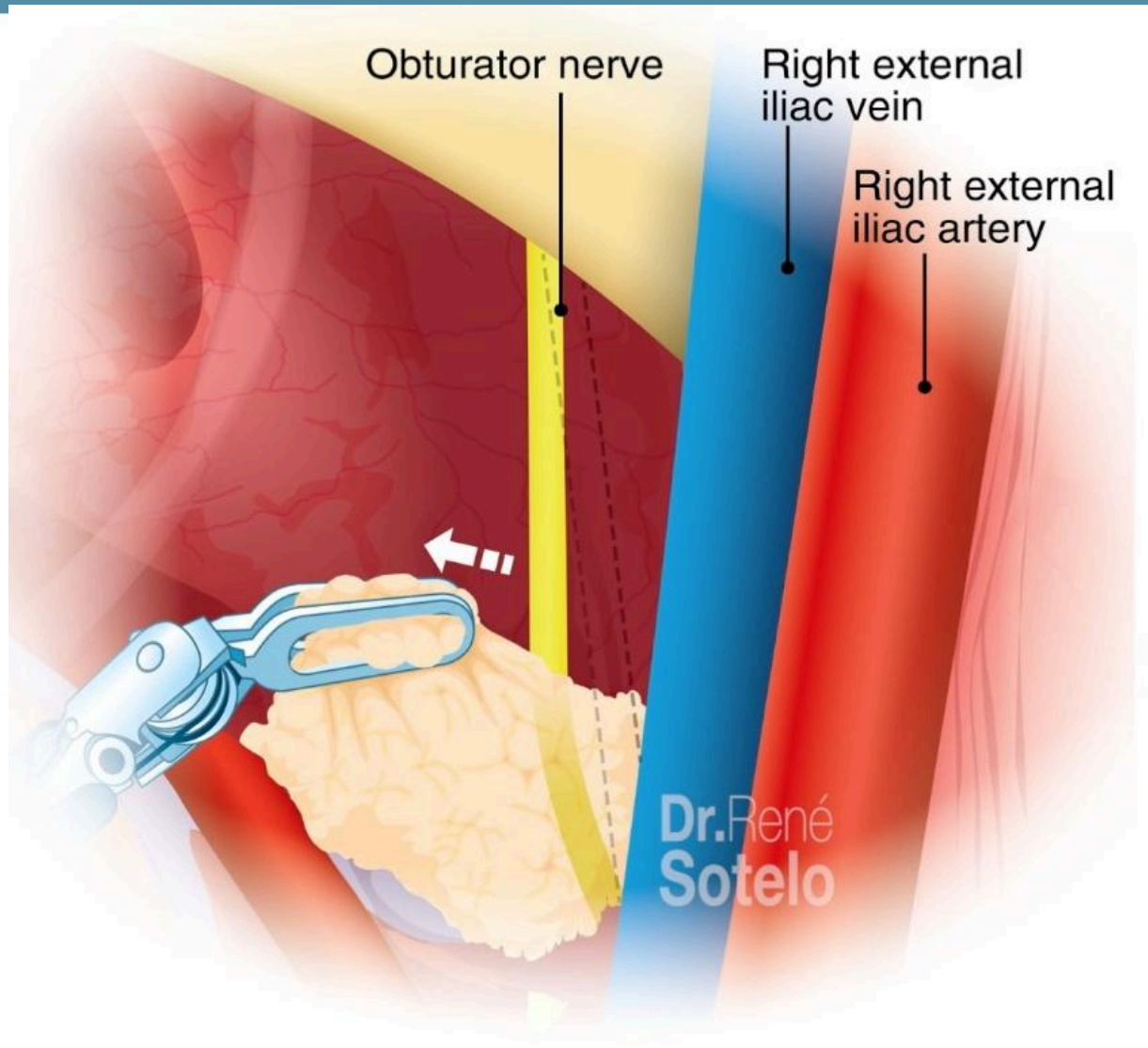
Obturator Nerve Injury:

Feasible Approximation



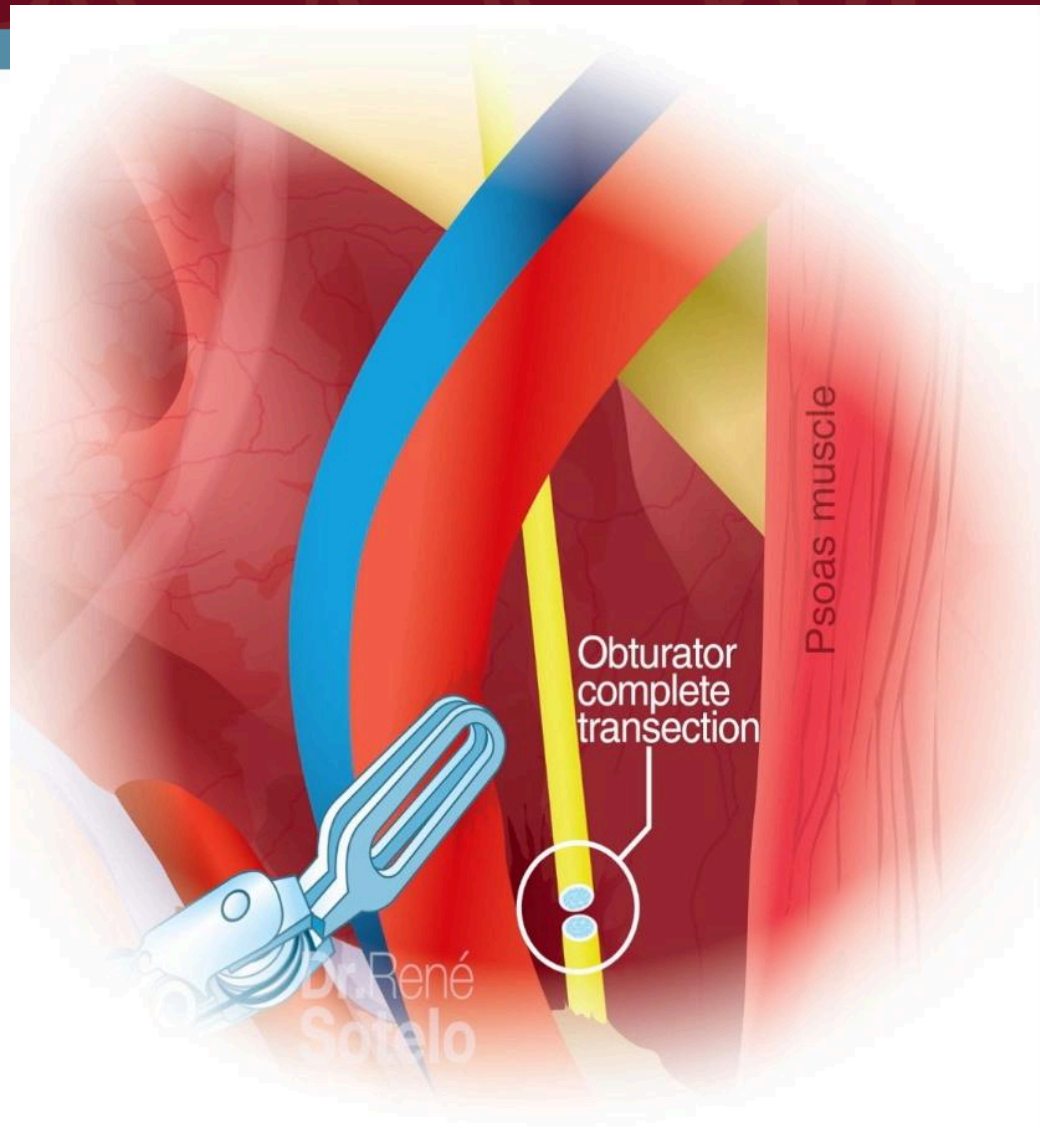
Obturator Nerve Injury:

Difficult to Locate

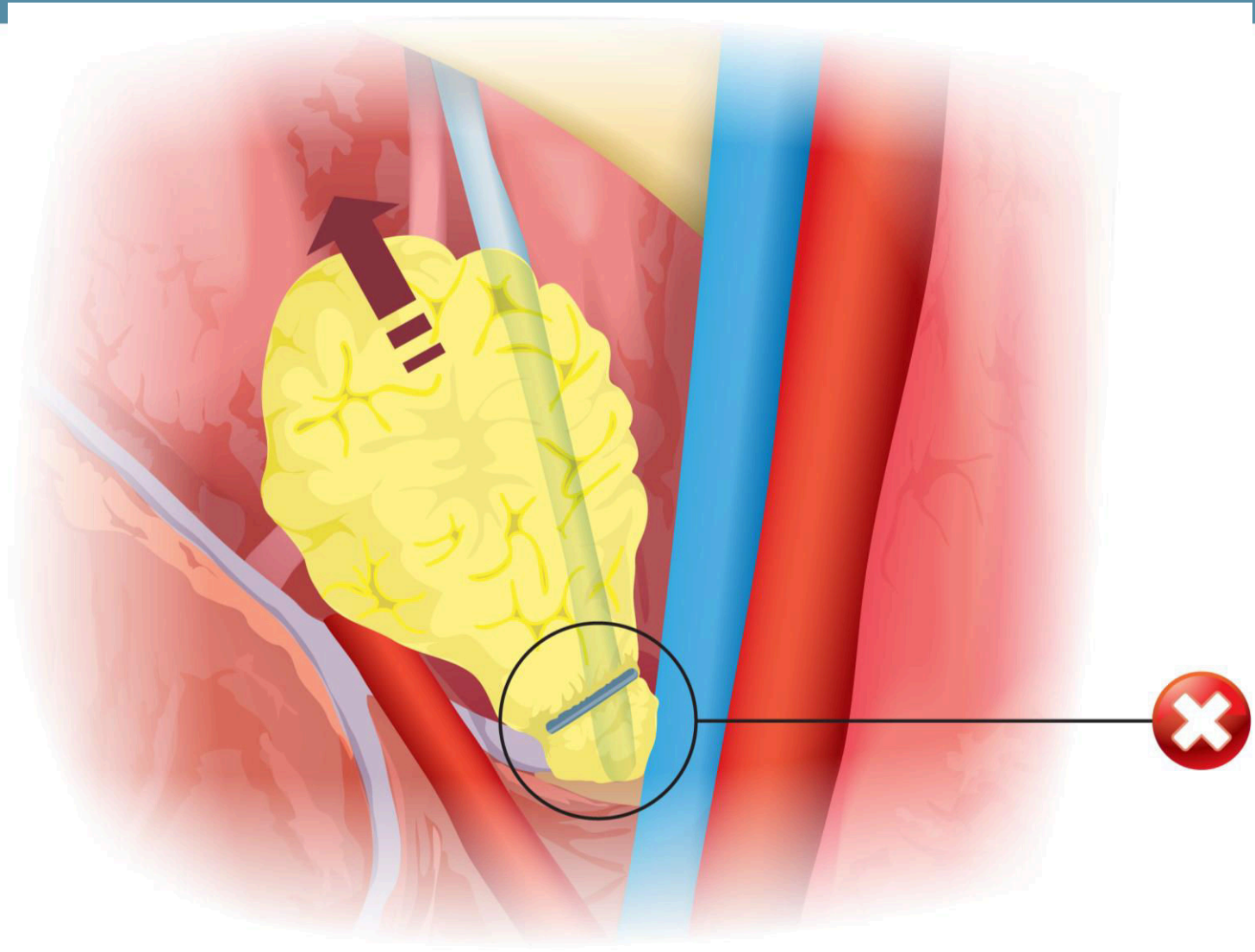


Obturator Nerve Injury:

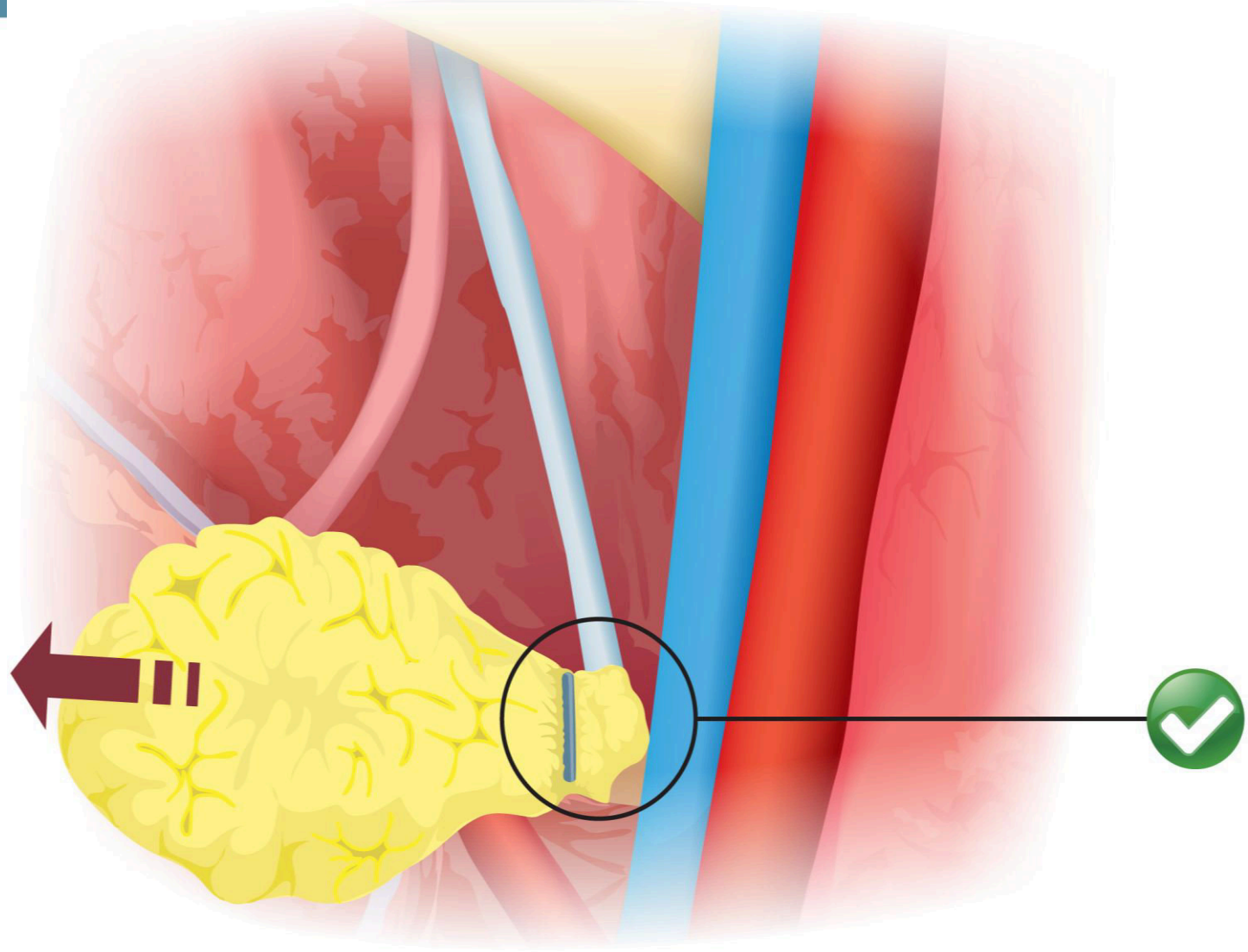
Medialization of the External Illiac Vessels



Obturator Nerve

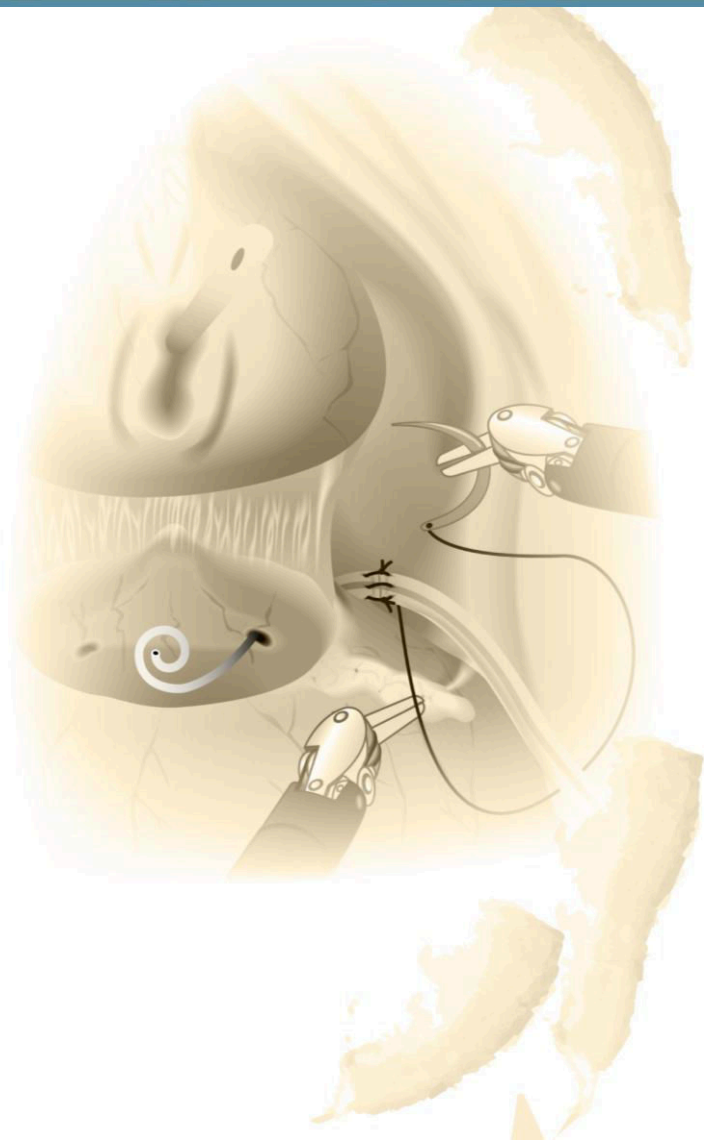


Obturator Nerve

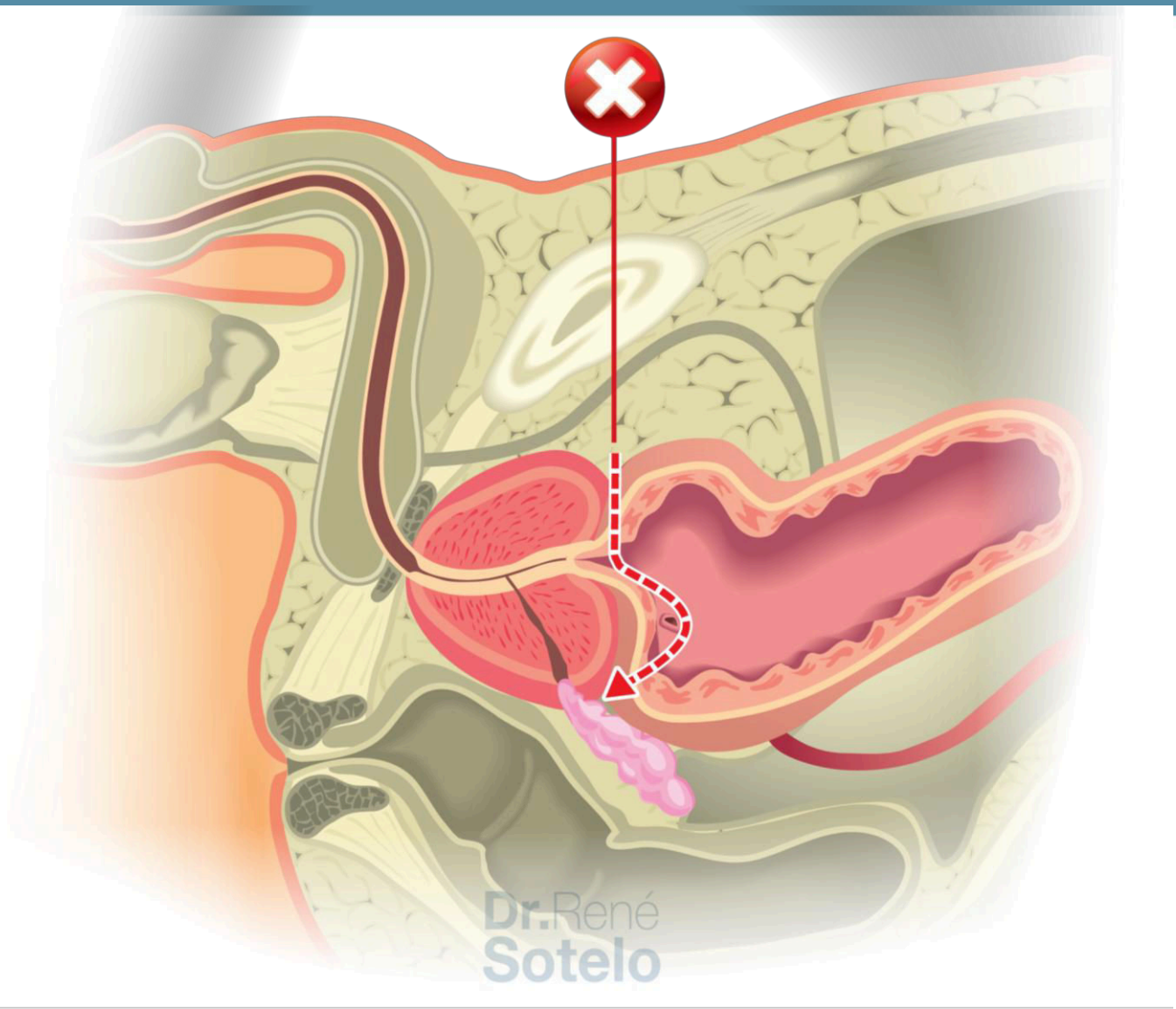


Obturador Nerve Injury:
Neurological Exam

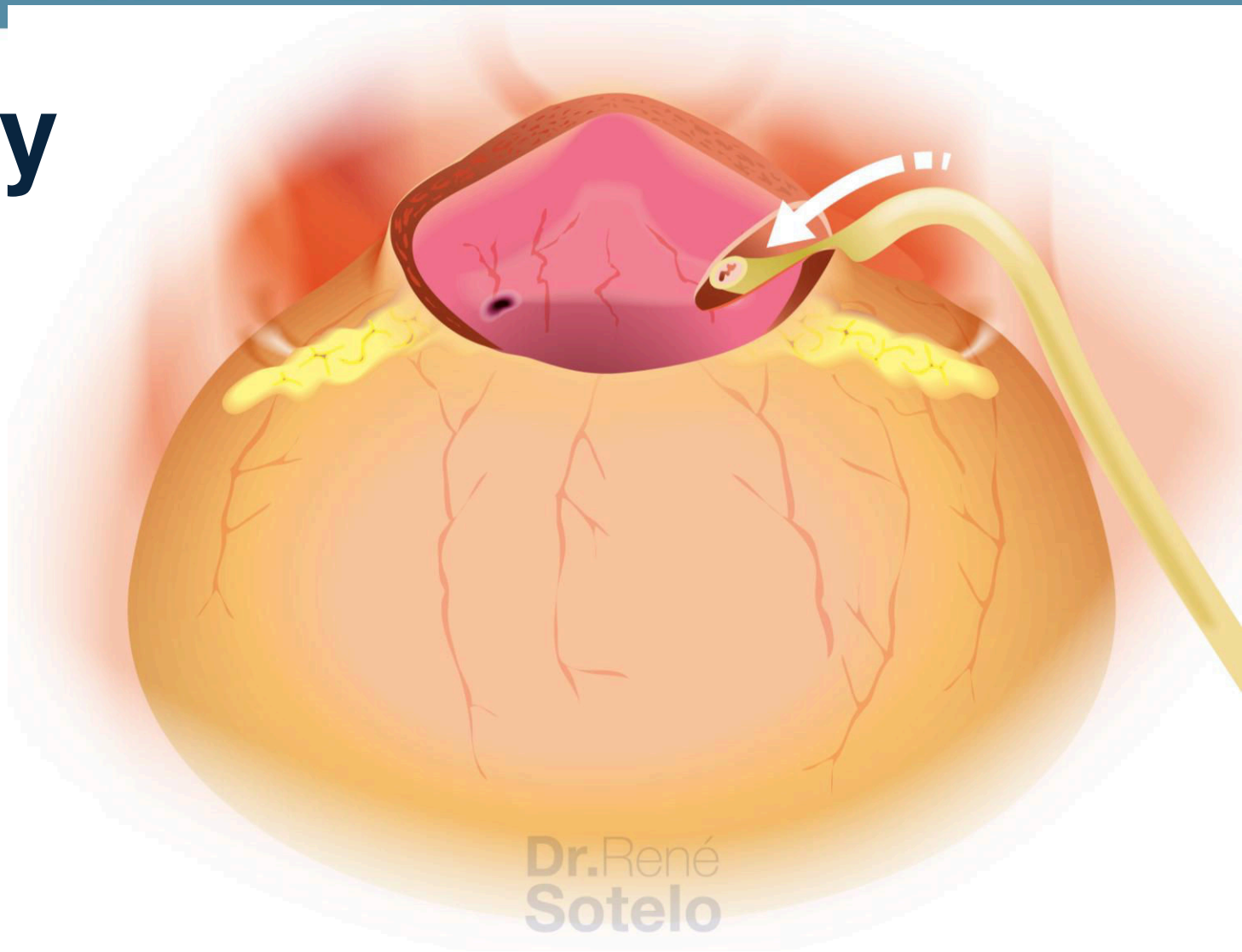
Ureteral Injurty



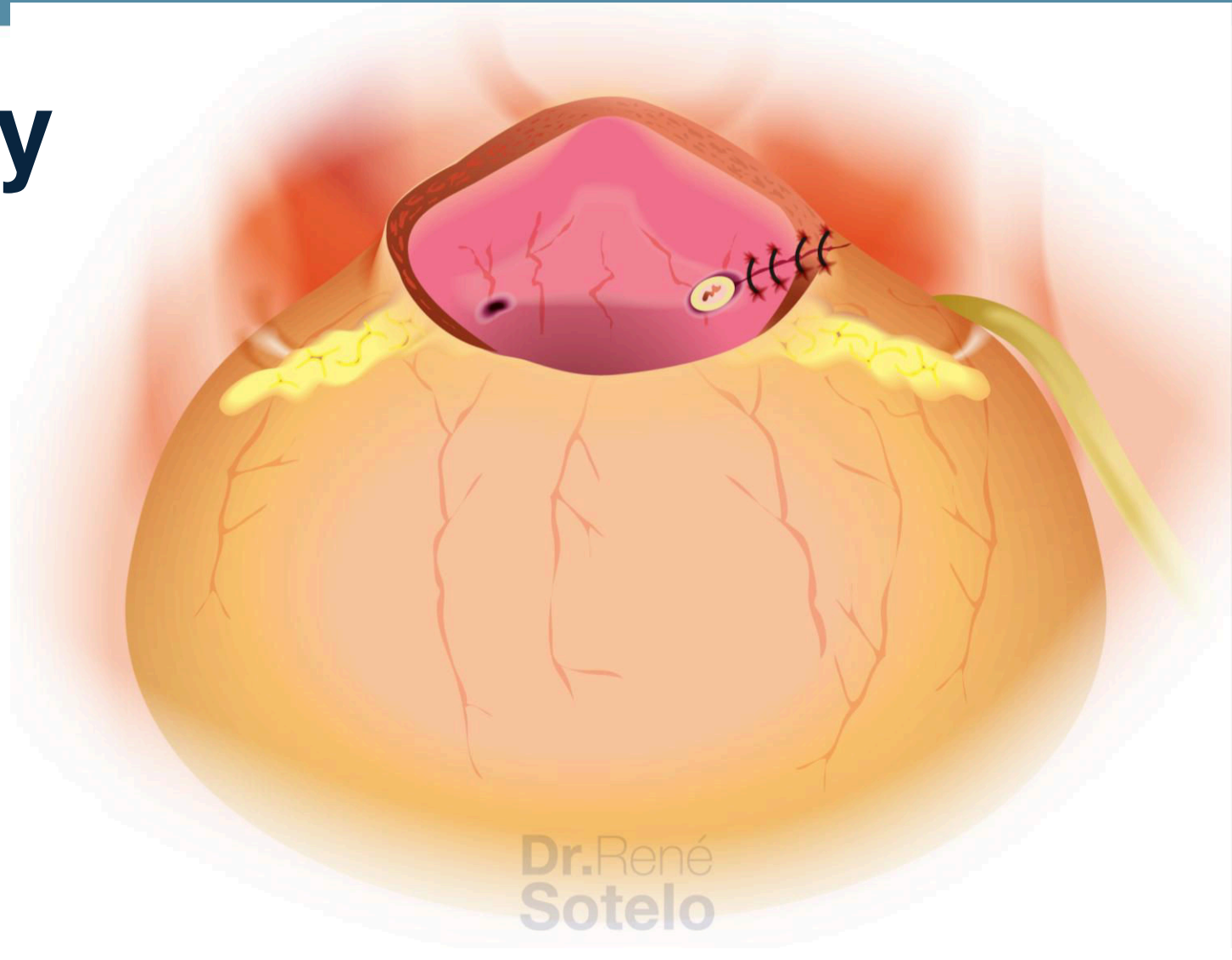
Ureteral Injury



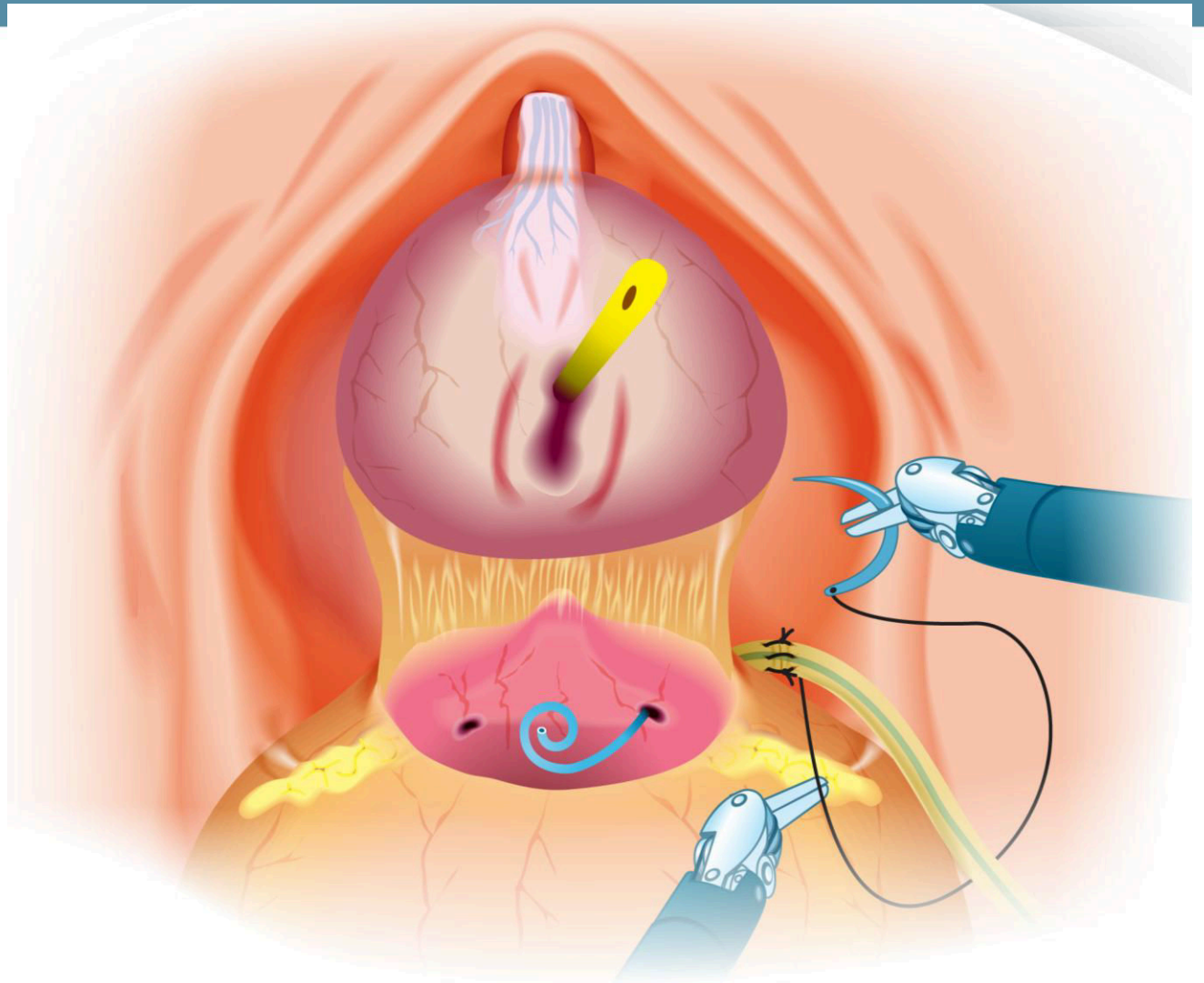
Ureteral Injury



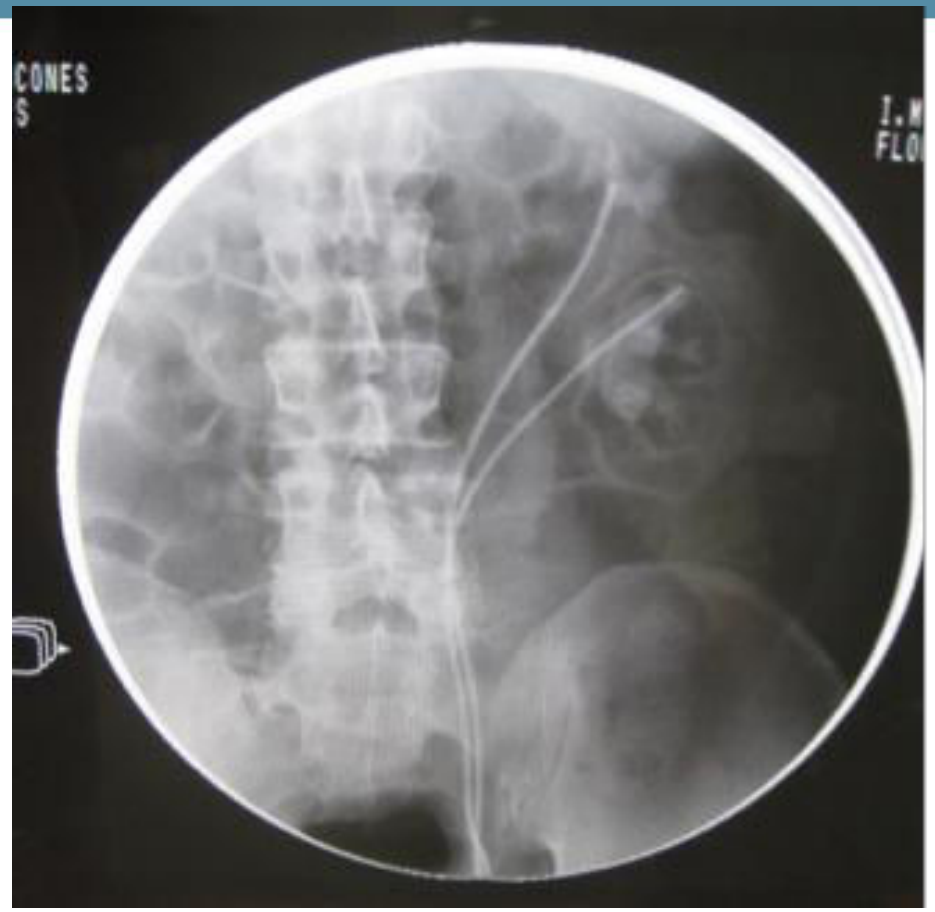
Ureteral Injury

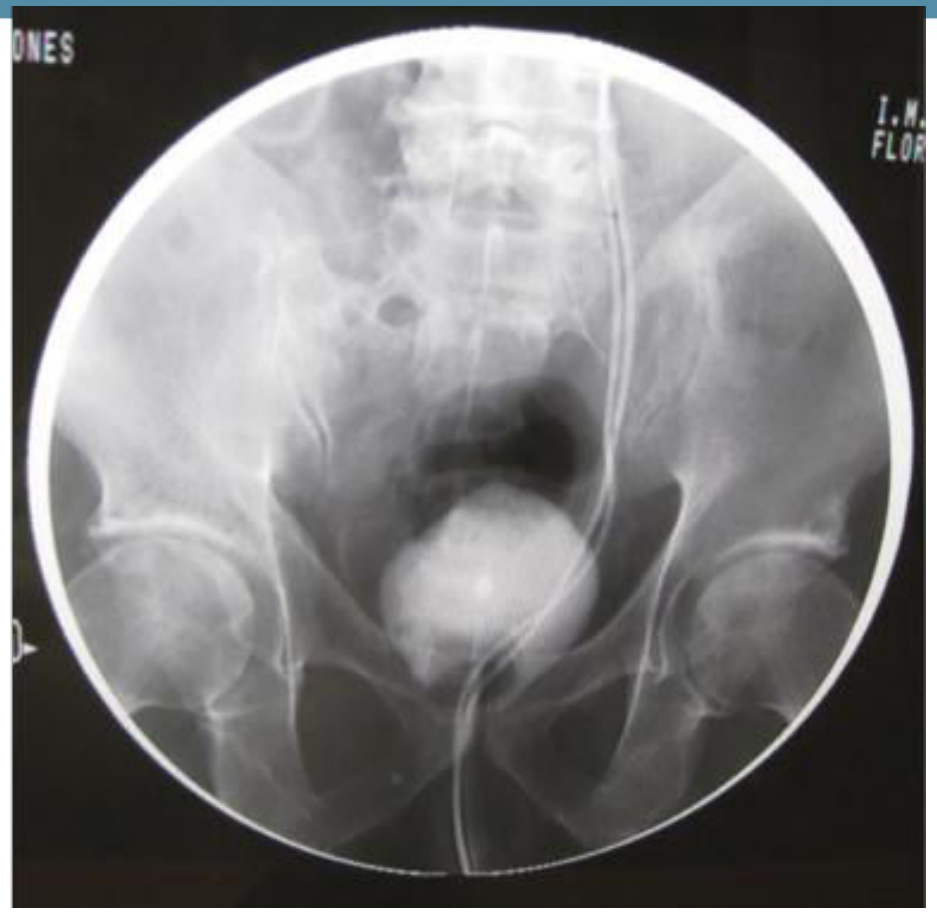


Ureteral Injury



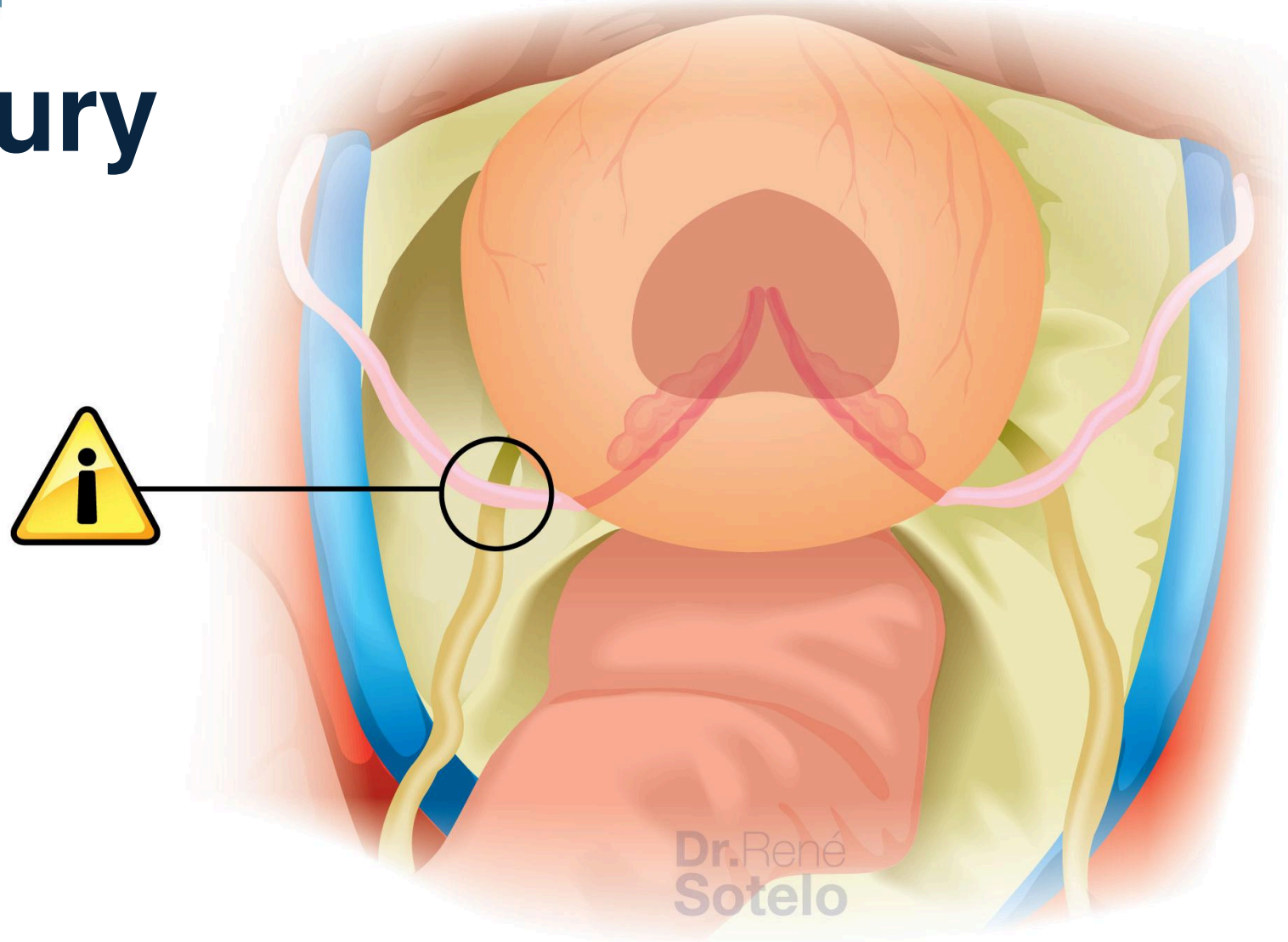
Ureteral Duplication



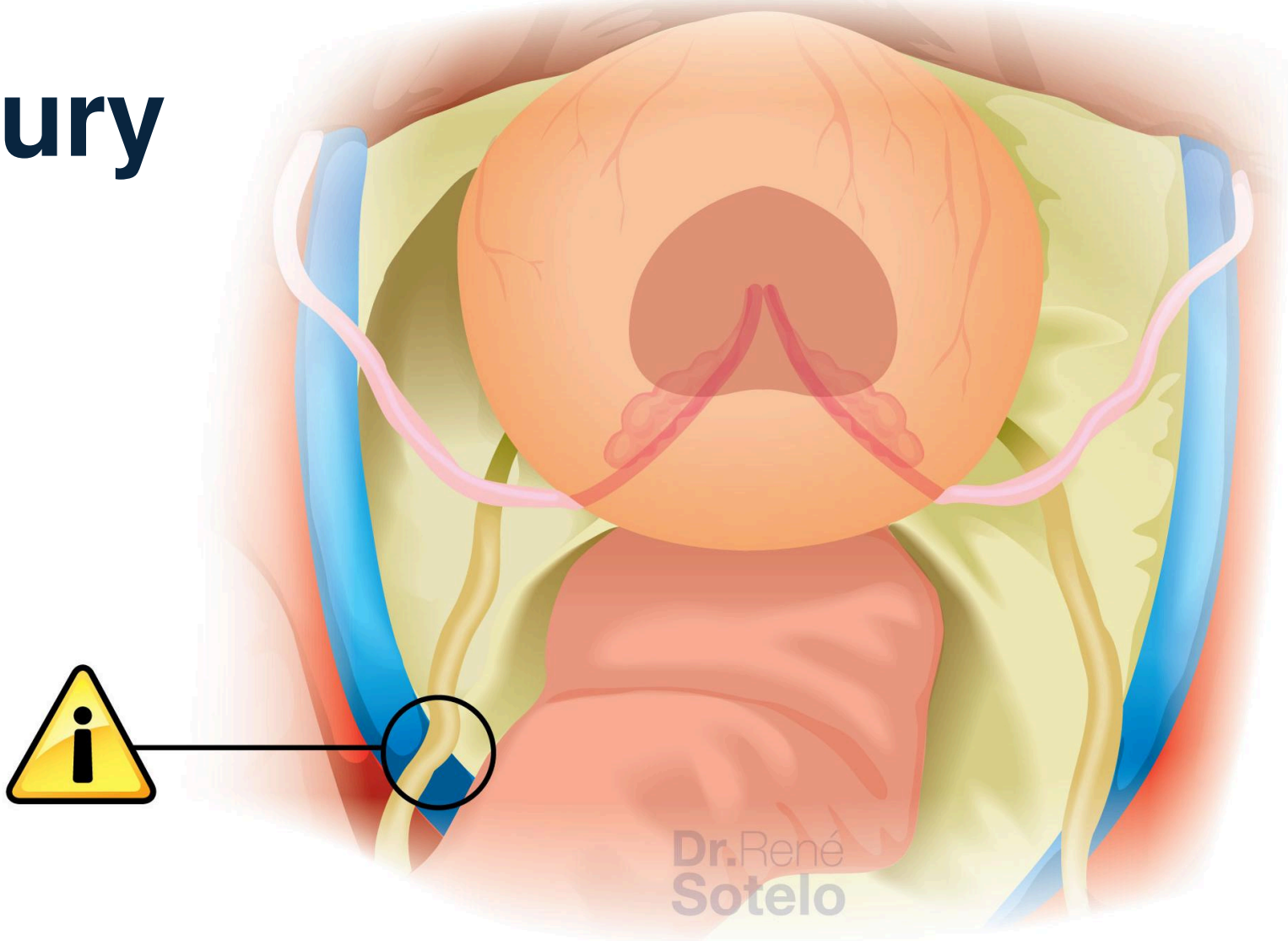


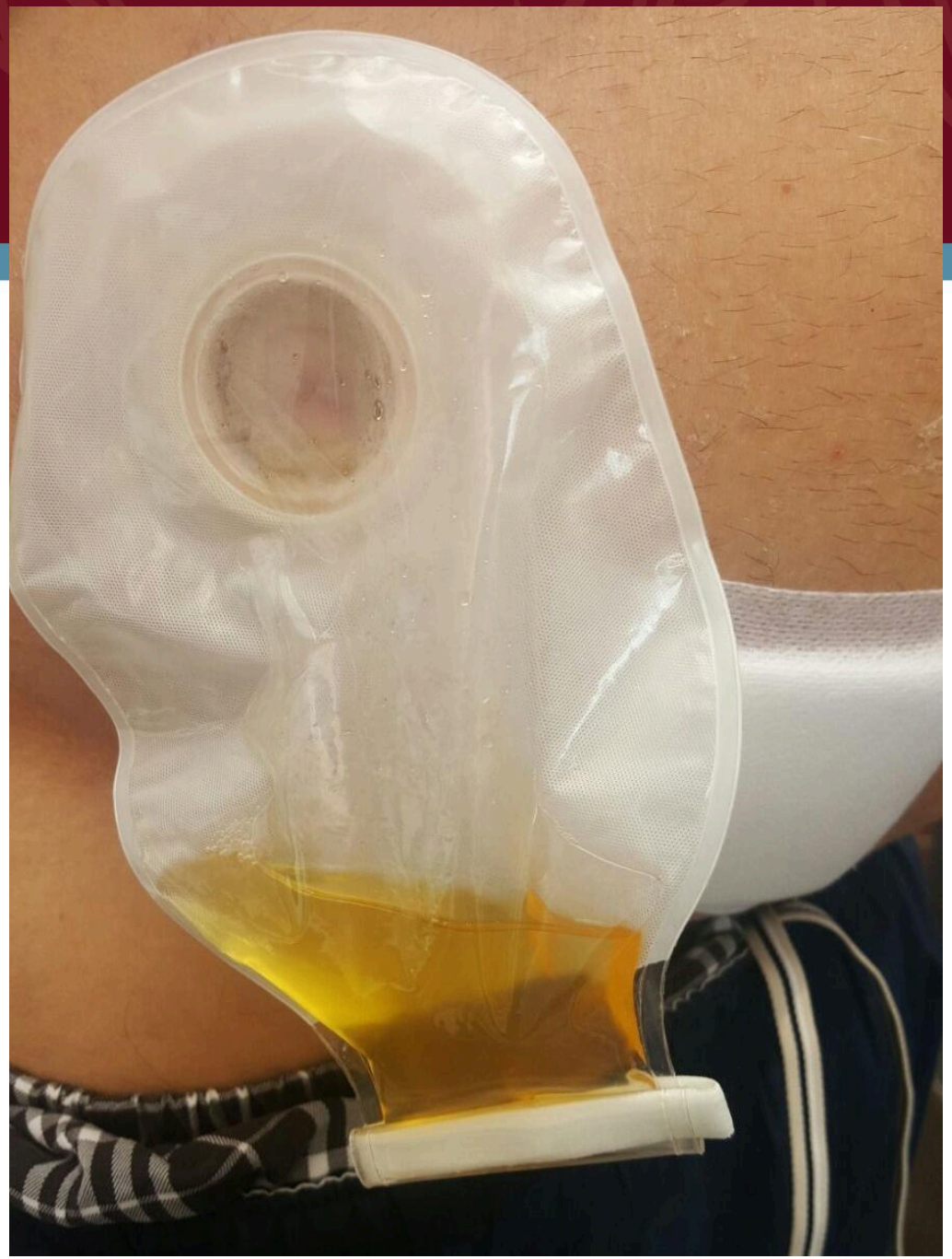
Incidence of 0.7% / 25% Complete Duplication

Ureteral Injury

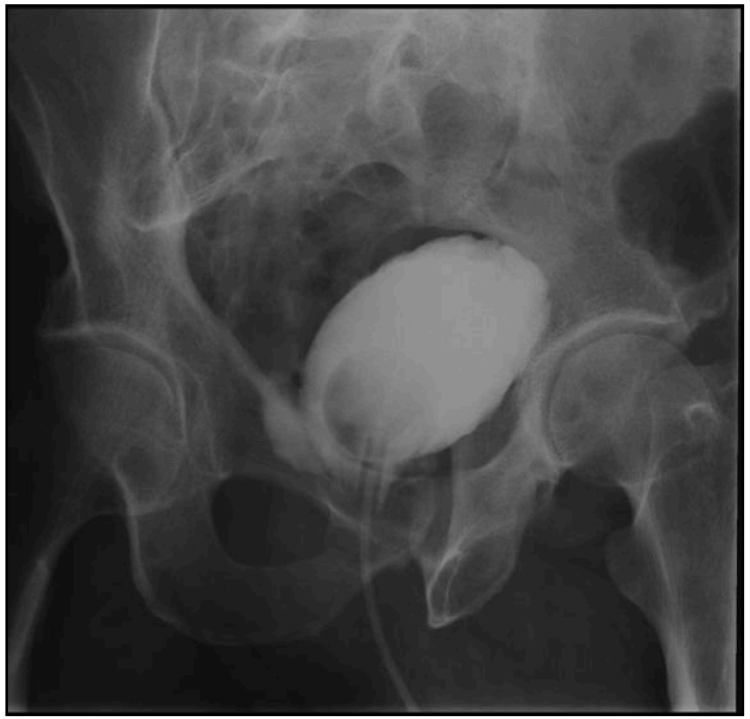


Ureteral Injury



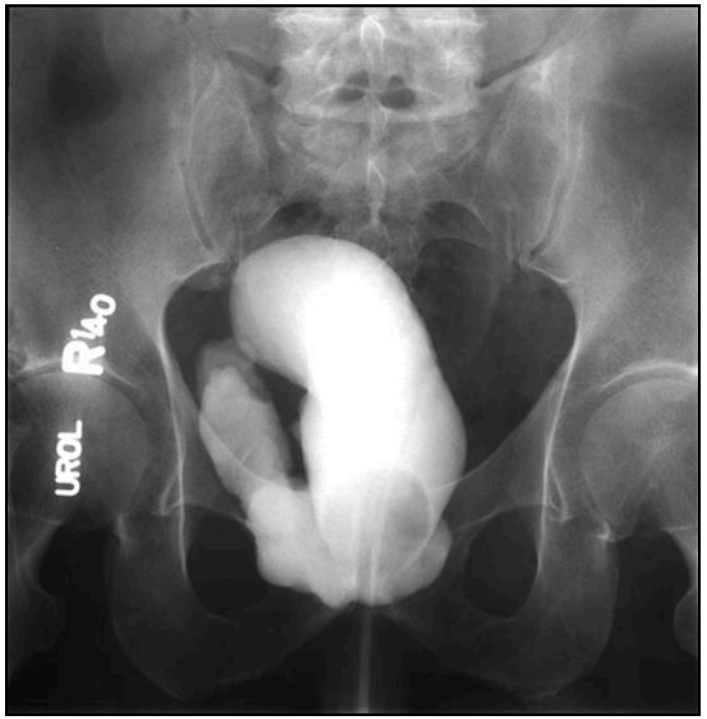


Prof Menon Classification



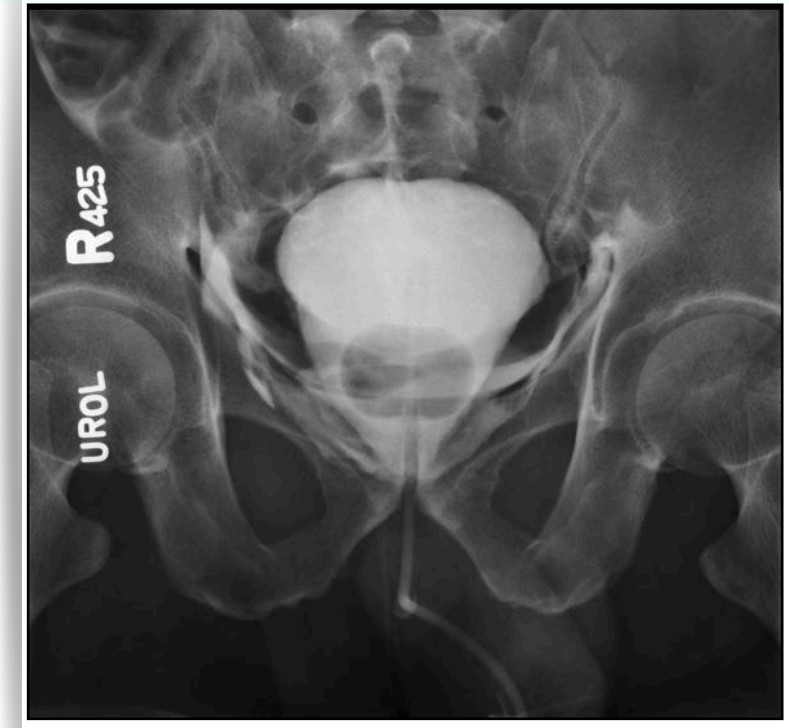
I - 5.4 %

<6 cm around the anastomosis



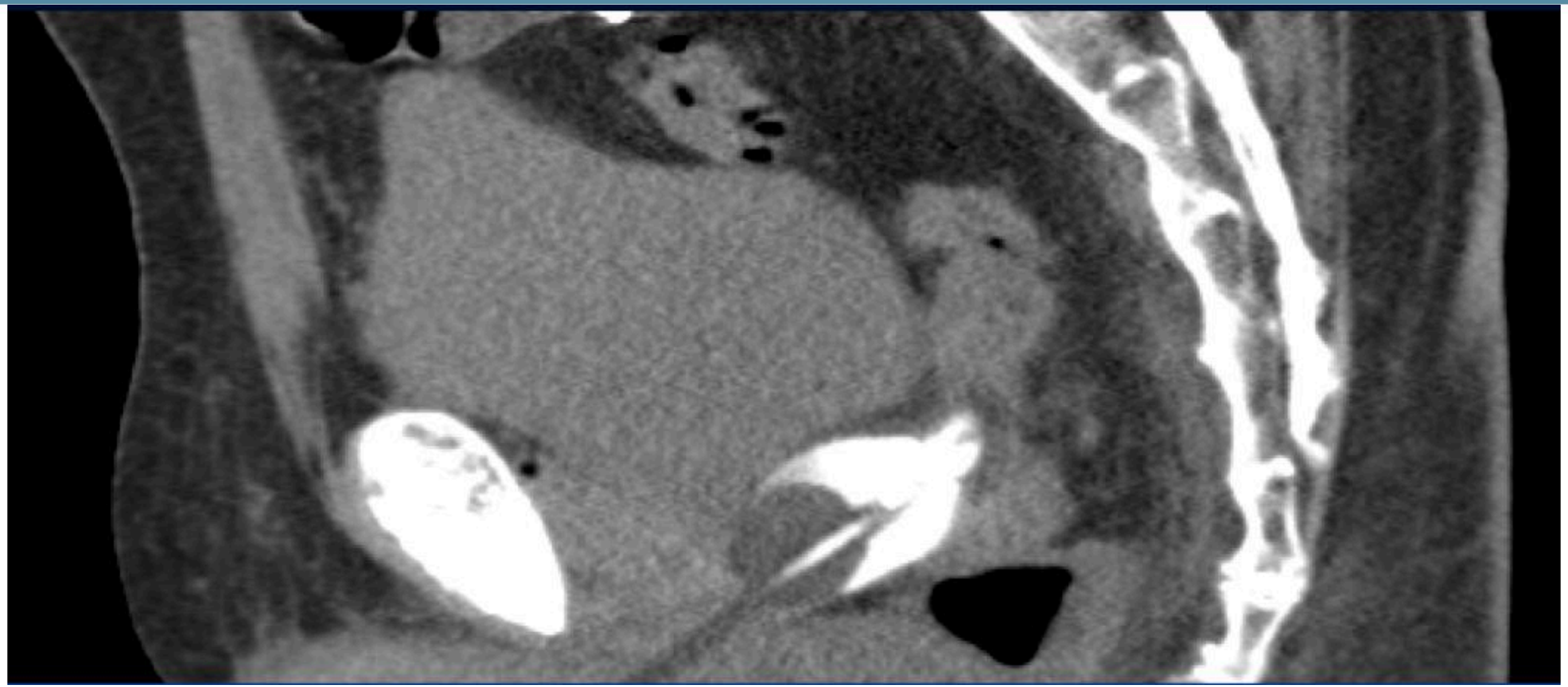
II - 2.6 %

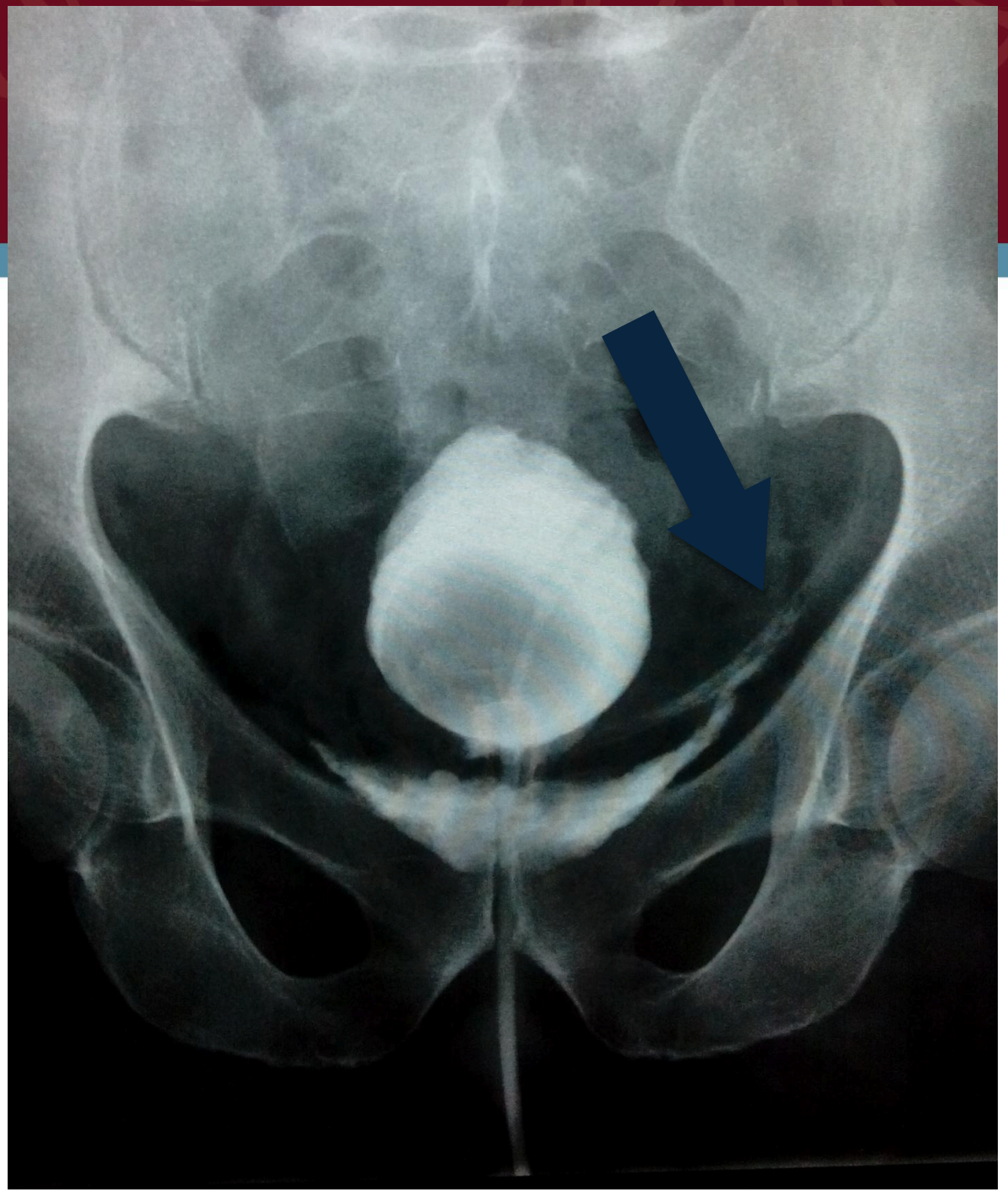
> 6 cm

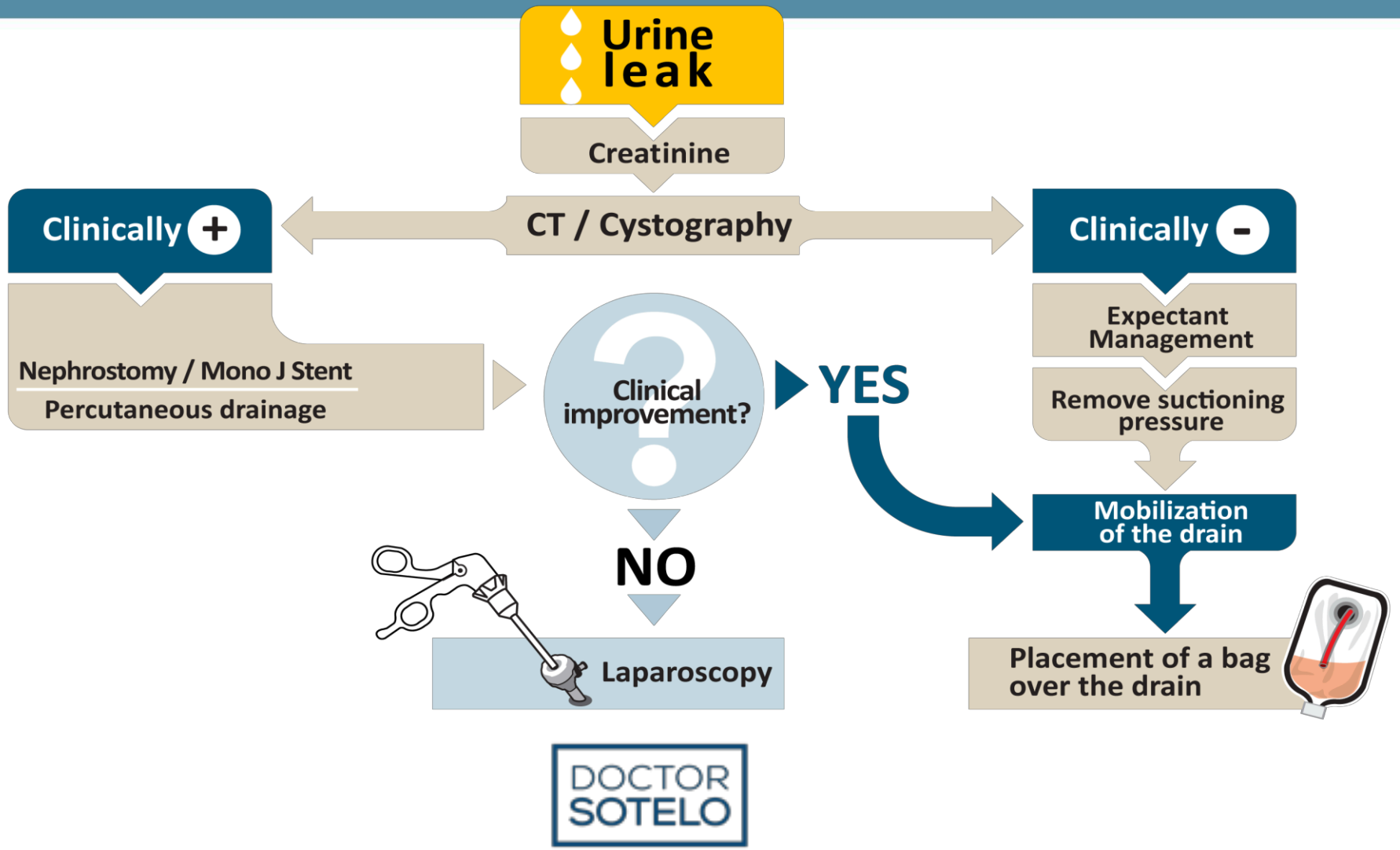


III - 0.7 %

contrast free in the abdomen



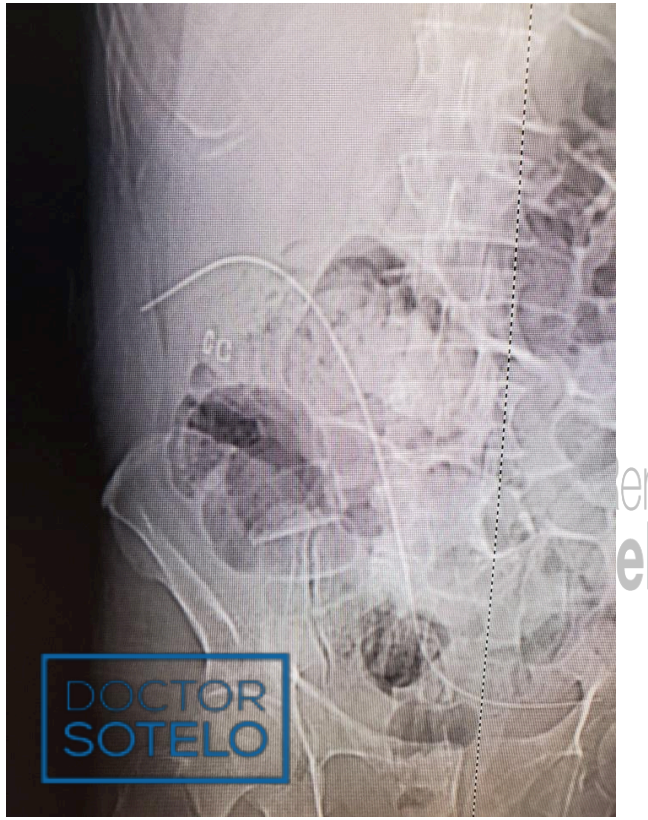


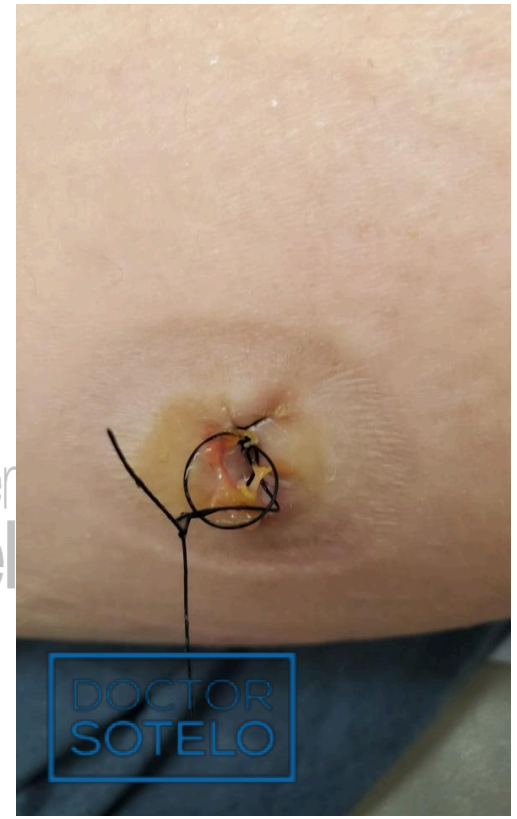

Urine leak
Creatinine
CT / Cystography
Clinically +
Clinically -
Nephrostomy / Mono J Stent
Percutaneous drainage
Clinical improvement?
YES
NO
Laparoscopy
Expectant Management
Remove suctioning pressure
Mobilization of the drain
Placement of a bag over the drain
DOCTOR SOTELO

Urine Leak

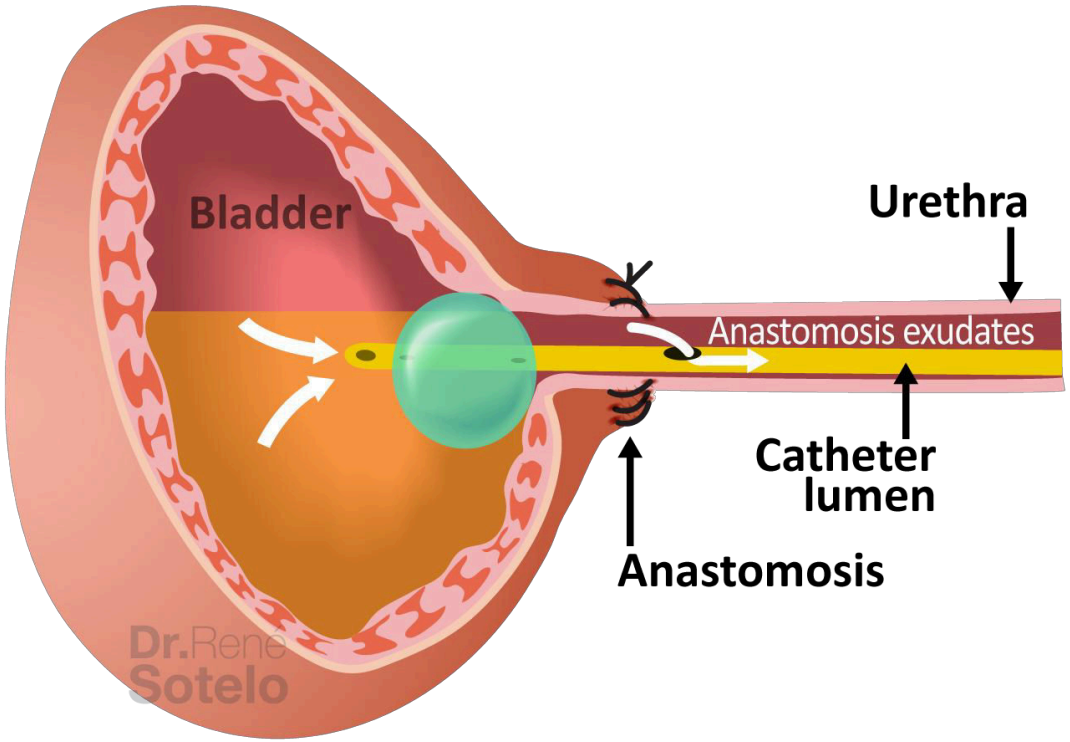
Clinically −

- Expectant Management
- Remove suctioning pressure
- **Mobilization of the drain**
- Placement of a bag over the drain





Side-fenestrated catheter
Decreases leakage at the urethrovesical anastomosis after robot-assisted laparoscopic radical prostatectomy



RCT of side-fenestrated catheter VS **Regular catheter**

4.6% **12.3%**

% Leakage at the anastomosis

Riikonen, J., et al. Scand J Urol (2014).

Surgical Repair

- **Robotic/Laparoscopic approach**
  - Pelvic or abdominal urinoma - laparoscopic drainage
    - Evaluation according to the degree of disruption
      - Placement of additional stitches or redo-anastomosis
      - Combined with placement of ureteral catheters
      - Extraperitoneal drainage

- **Open Approach**


G-U TEK

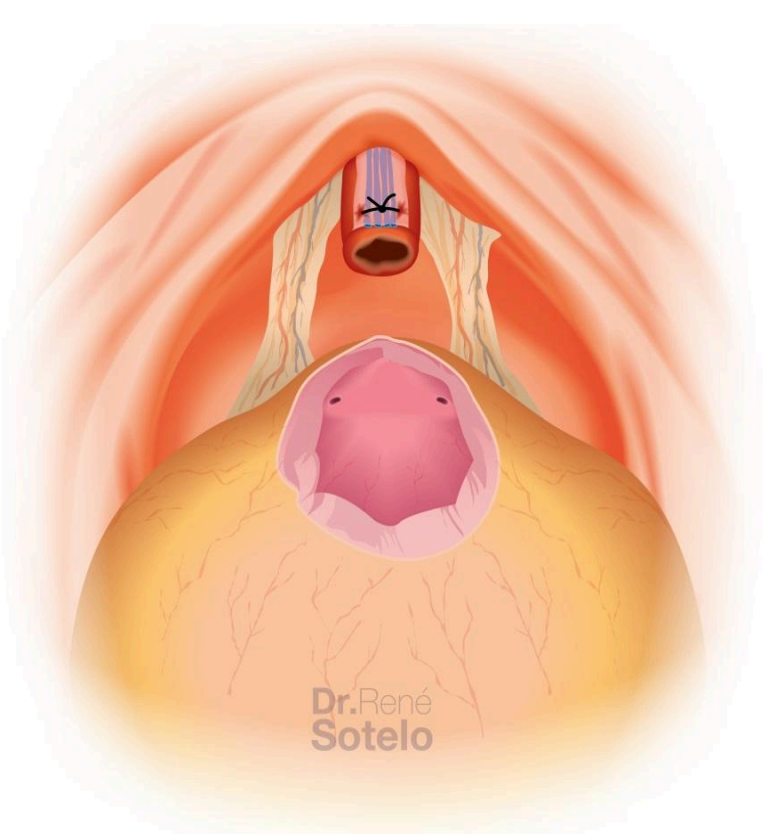

URETERAL CATHETER CONNECTING ADAPTER
REF UCA5-95
Used for the incorporation of ureteral catheters within the same Foley catheter drainage system
LOT ME60
2028-05-30
Rx only
STERILE R
PEEL OPEN
Manufactured for :
G-U Tek, Inc.
Warren, NJ 07059
WWW.gutekinc.com
Patent 5,531,723
PC-1071b

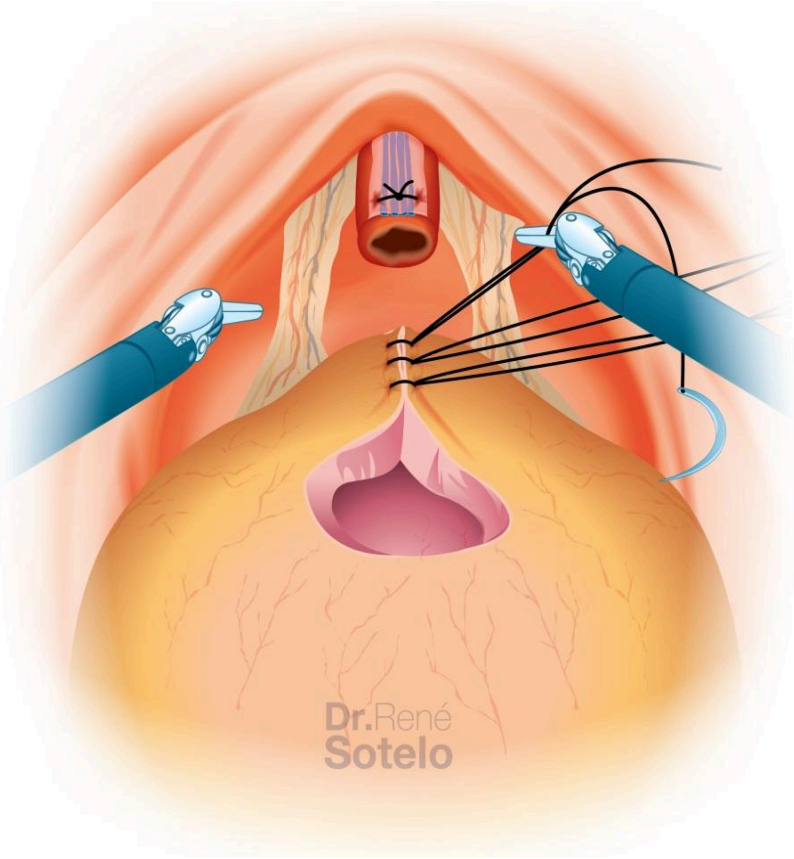
Prevention

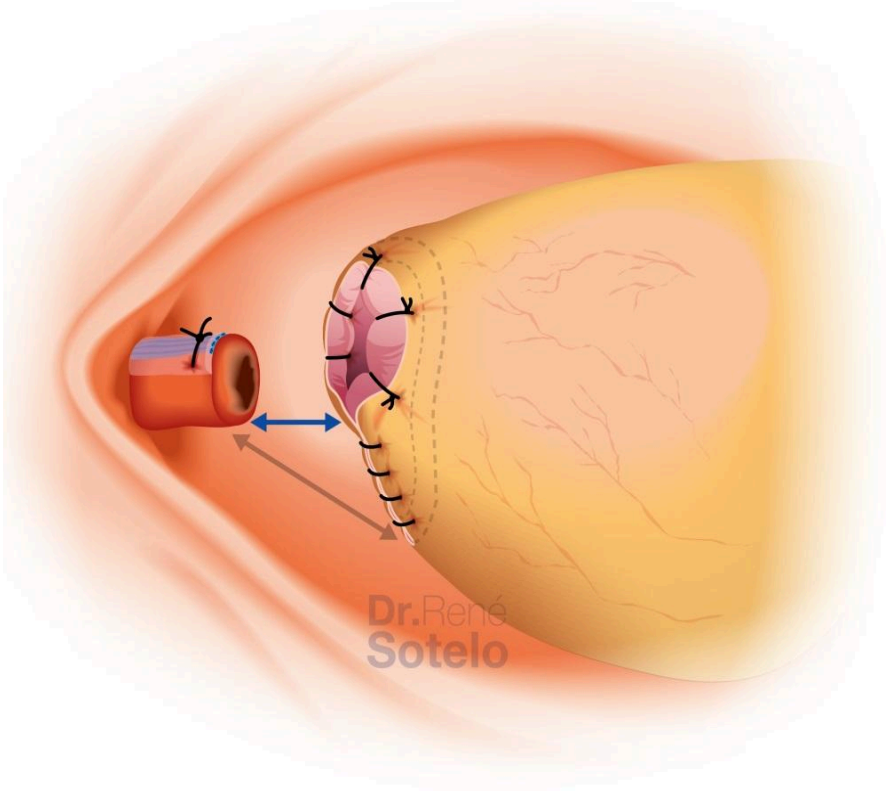
- **Bilateral Double-J ureteral stent,**
  in case UOs are in close proximity to the anastomosis,
  cases with previous TURP

- **Posterior tennis-racquet,**
  to distance the UOs from the anastomosis

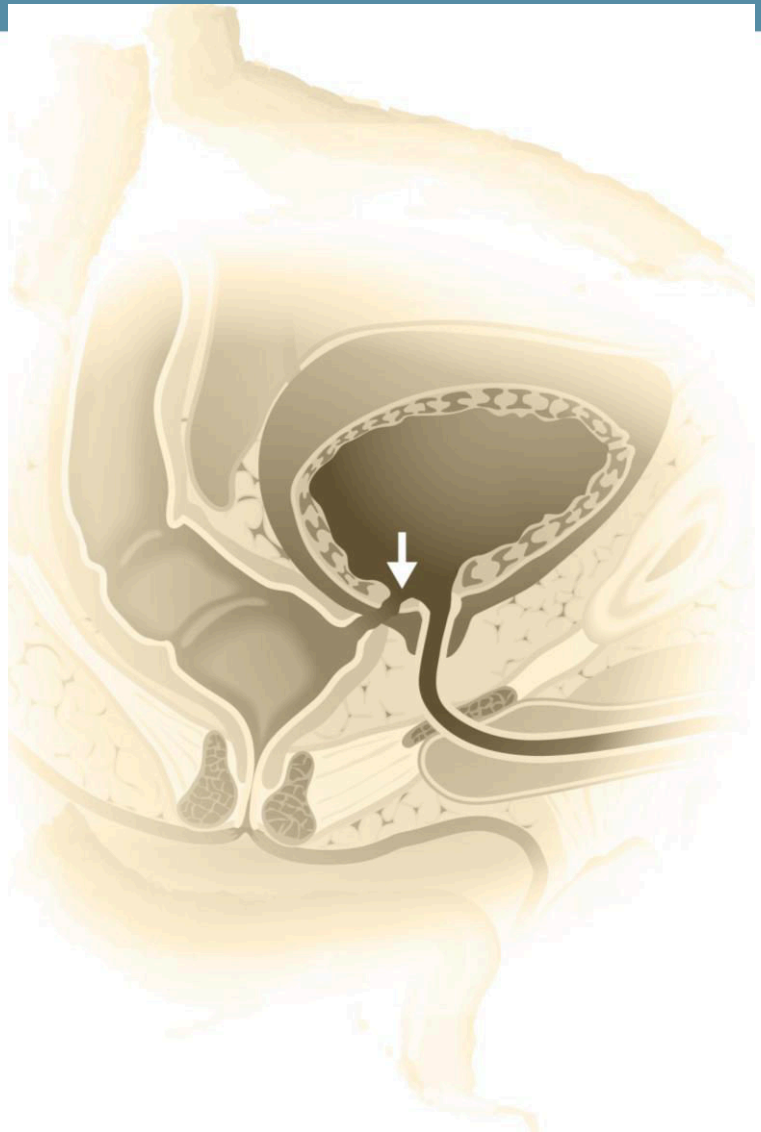
Posterior tennis-racquet







Rectal Injury



AUA-2026
Washington, DC
MAY 15-18

Rectal Injury Incidence

Open.....**(0.5-1.5%)**

Laparoscopic.....**(0.7-2.4%)**

Robotic.....**(0.2-0.8%)**

Walsh et al J Urol. 1992,Catalona et al J Urol 1999
Lepor et al J Urol 2001 Guilloneau et al J Urol. 2003
Rassweiler et al J Urol 2003,Turk et al Eur Urol 2001
Katz et al Urol. 2003

Rectal Injury: Management

- Primary repair performed with vascularized tissue interposition prevented rectourethral fistula development

- In men with unrecognized rectal injury, the rectourethral fistula tended to persist and eventually required delayed surgical repair

Rectal Injury: Management

- Two layer sutured repair
- If non-nerve sparing, imbricate this lateral tissue in the midline as an additional layer
- If concern for proximity to anastomosis (fistula risk), tack the rectum to the levator muscle, pulling the rectal repair away from anastomosis
- Pedicle of omentum over repair – JP drain
- Broad-spectrum antibiotics
- Low Residue diet, Stool softeners, Nothing per Rectum
- Discharge after Bowel Funtion return, Cystourethrogram prior to catheter removal

When is fecal diversion required?

Consider if:

- Suture line under tension
- Gross fecal spillage
- Prior radiotherapy

Sequelae of Rectal Injury

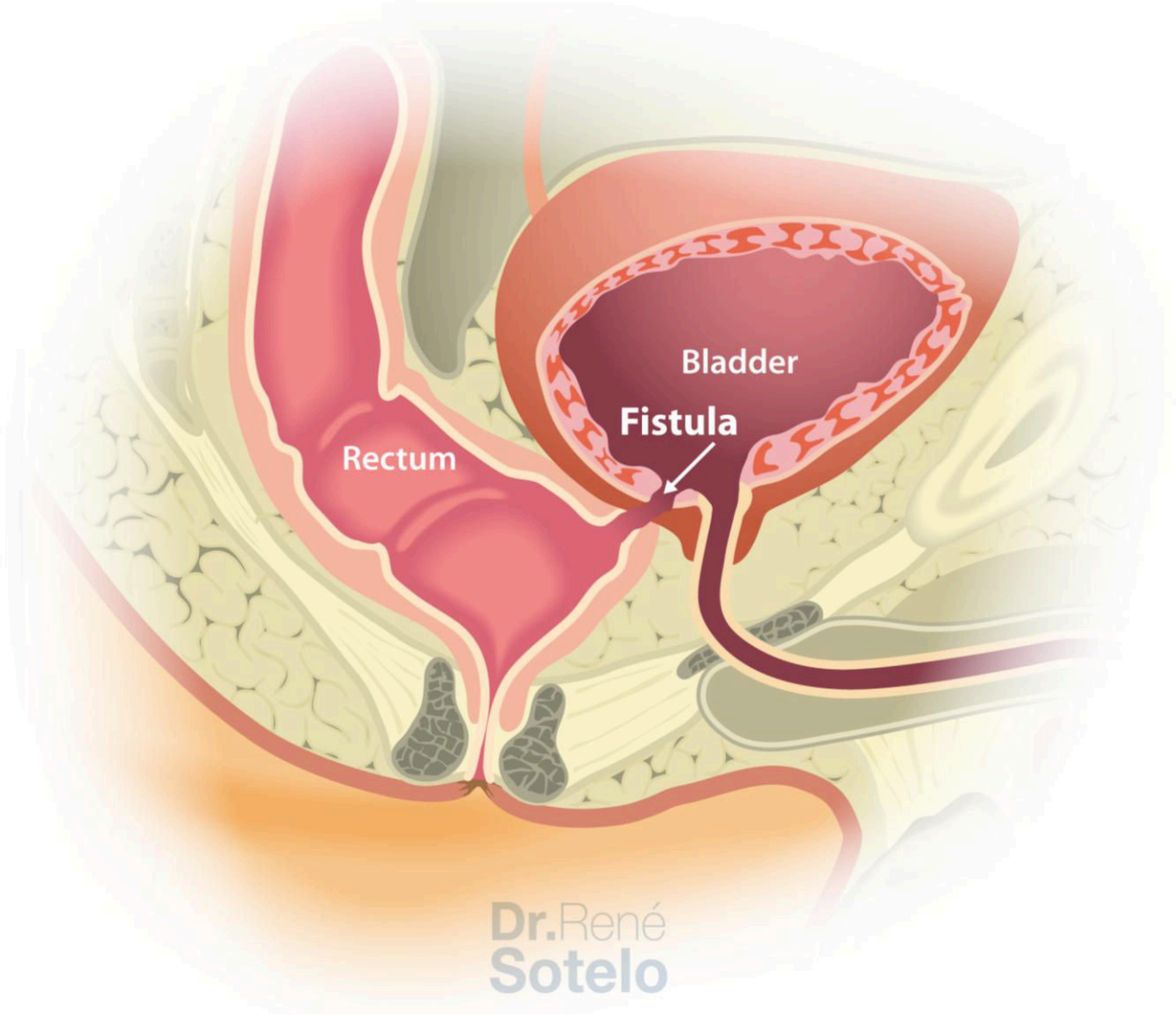
Pelvic abscess.....**(0.1%)**

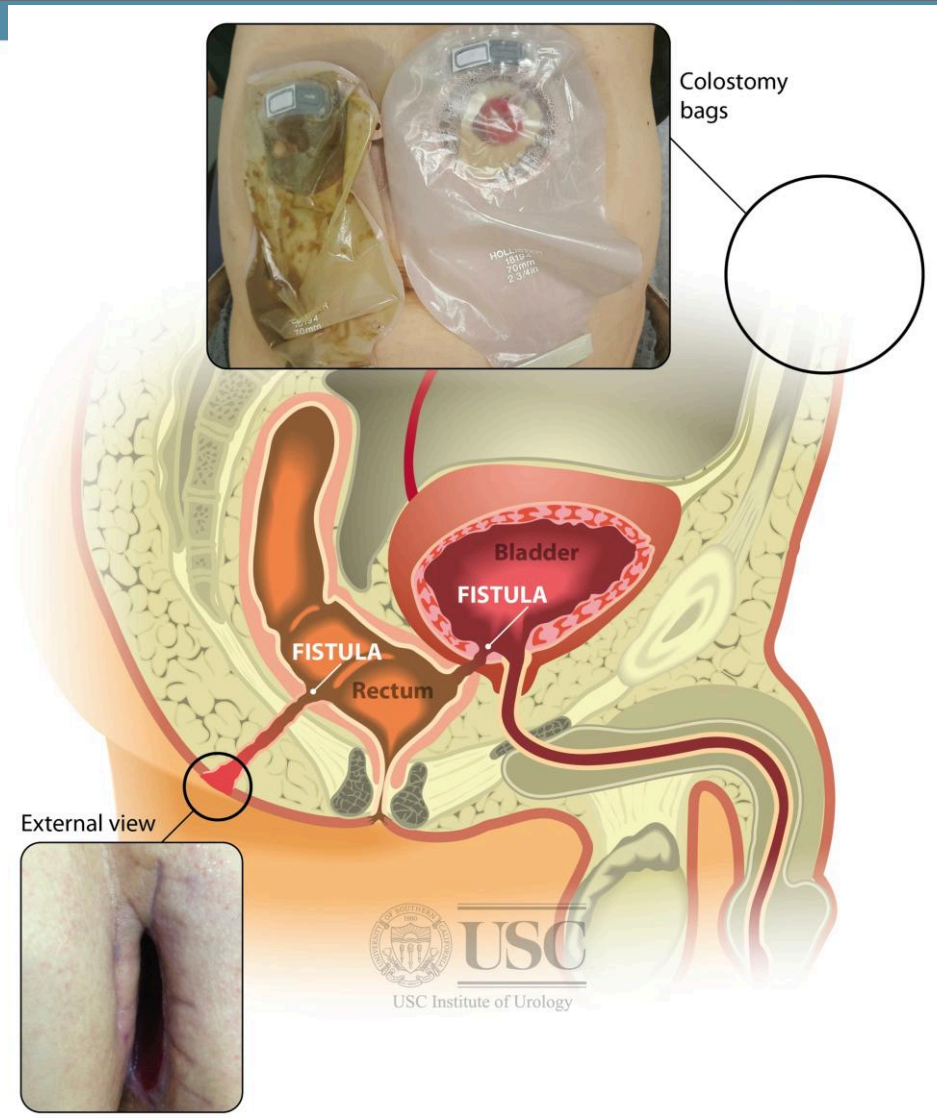
Recto urinary fistula.....**(0.1-1%)**

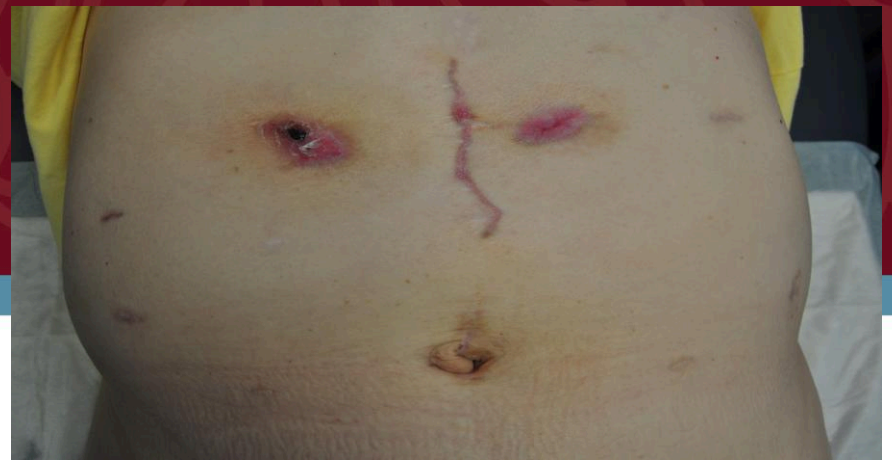
Guilloneau et al J Urol 2003, Benoit et al Urology 2000

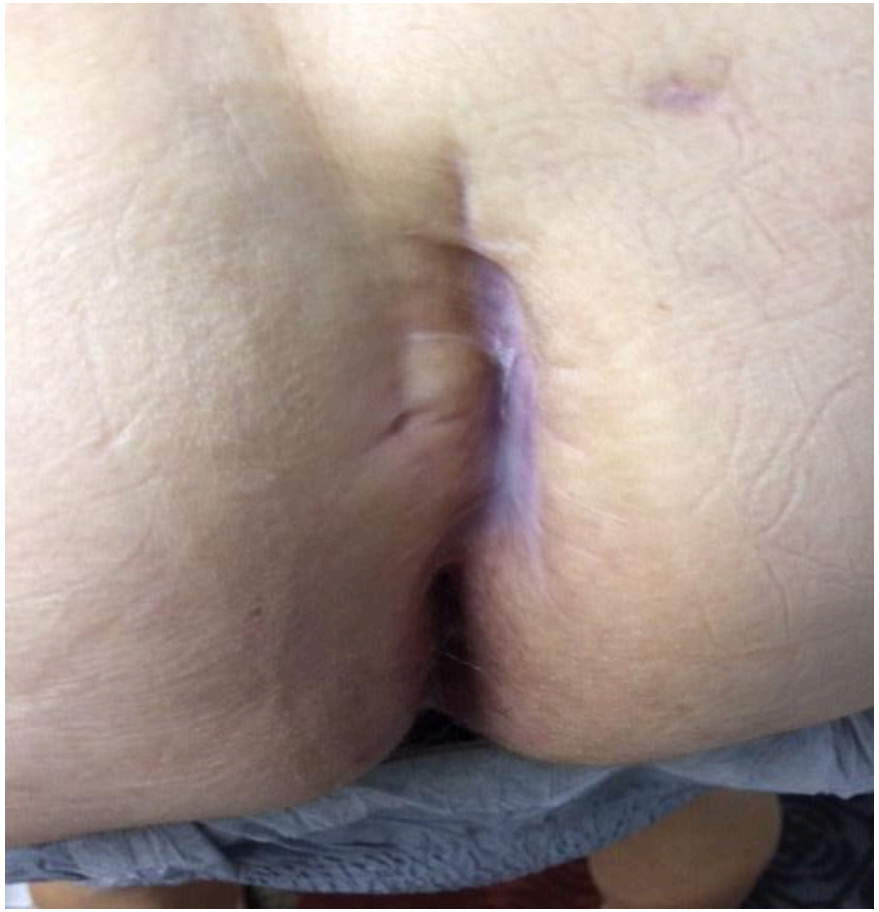
Sequelae of Rectal Injury

Sequelae of Rectal Injury




Colostomy bags
Bladder
FISTULA
FISTULA
Rectum
External view
USC
USC Institute of Urology





Sequelae of Rectal Injury

- After laparoscopic surgery, if the patient is not continuously improving, something is wrong!
- Keep a high index of suspicion and be liberal with imaging and testing
- CT scan is the initial imaging of choice for the majority of operative complications

Teamwork Makes The Dream Work

A vision becomes a nightmare when the leader has a big dream and a bad team


0:47

Sharing is Caring

Sharing your complications translates to improvements in patient care

Dr. René Sotelo
@DoctorSotelo

Thank you!