



Short is Beautiful – PD with a Novel Short Catheter

Prof Abdullah Alhwiesh

Department of Internal Medicine, Nephrology Division, King Fahd University Hospital, Imam
Abdurhman Bin Faisal University, Saudi Arabia

Outline

- Introduction
- Catheter insertion technique
- Catheters type
- Novel three cuff saudi catheter
- Conclusion

Each center should have a dedicated team
involved in implantation and care of catheters.

(Evidence level A)

PDI 2010

- Each center should analyze its catheter survival and complications: reasonable targets should include a catheter survival of >80% at 1 year and peritonitis rate of more than one episode/24 patient-months.

(Evidence level C)

PDI 2016

We recommend that local expertise at individual centers should govern the choice of method of PD catheter insertion (1B).

PDI 2016

Regular **audit at not less than 12-month** intervals of the outcome of catheter insertion as part of multidisciplinary meetings of the PD team and the access operators (1B).

PDI 2016

- Bowel perforation: < 1%
- Significant hemorrhage: < 1%
- Exit-site infection within 2 weeks of catheter insertion < 5%
- Peritonitis within 2 weeks of catheter insertion < 5%
- Functional catheter problem requiring manipulation or replacement or leading to technique failure: < 20%

PD catheter insertion

Which technique should be adopt ?

IMPLANTATION TECHNIQUES

- * **Subcutaneous technique (**
 - **Peritoneoscopy**
 - **laparoscopy**
- * **Laparotomy**  **95 % of cases**

Management of access problems is a key
factor for the improvement of peritoneal
dialysis technique survival

Which catheter shall we use?

Several prospective studies are designed to compare and find out which **catheters have fewer mechanical problems**

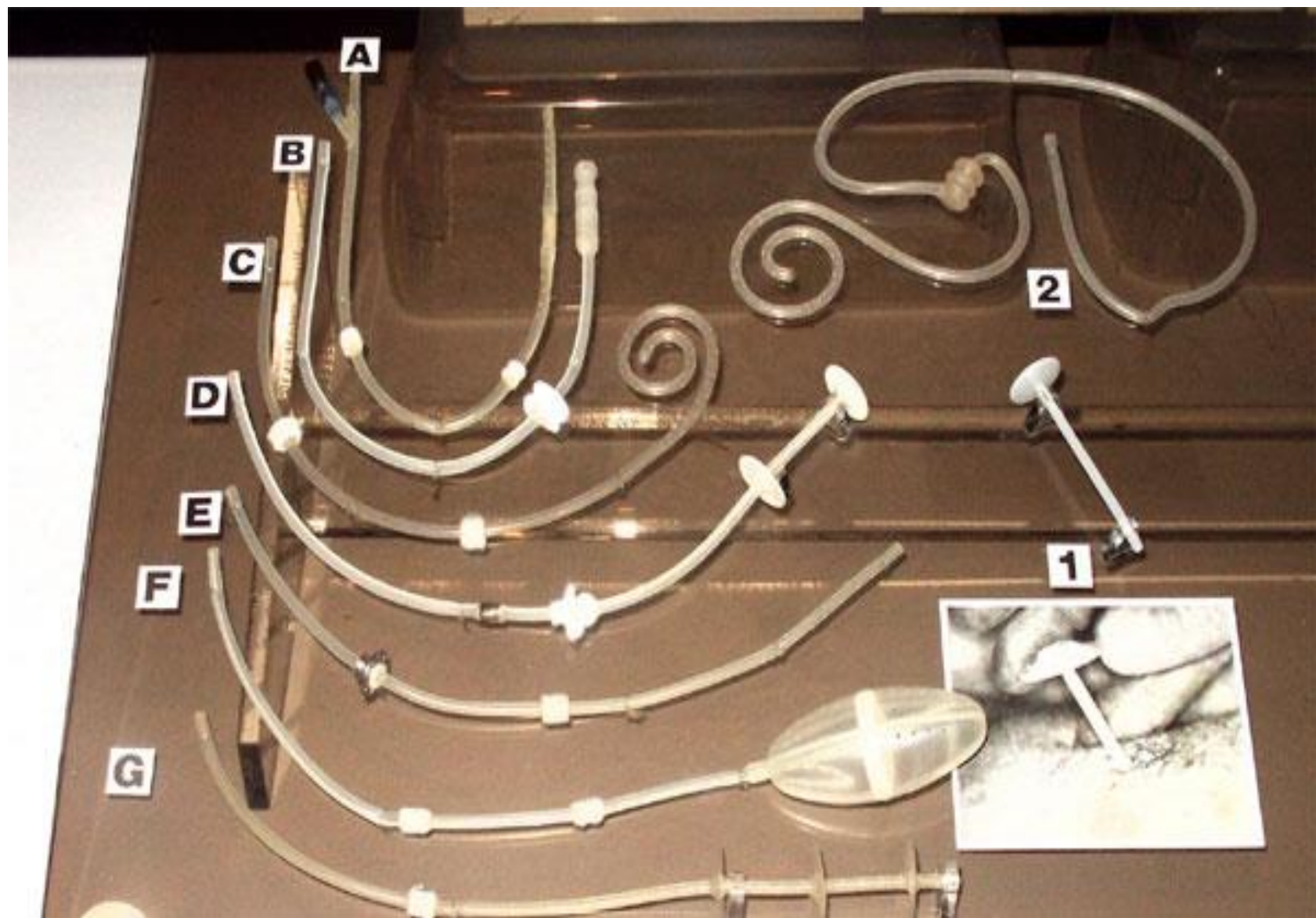
1-Migration

2-Obstruction

3-Entrapment

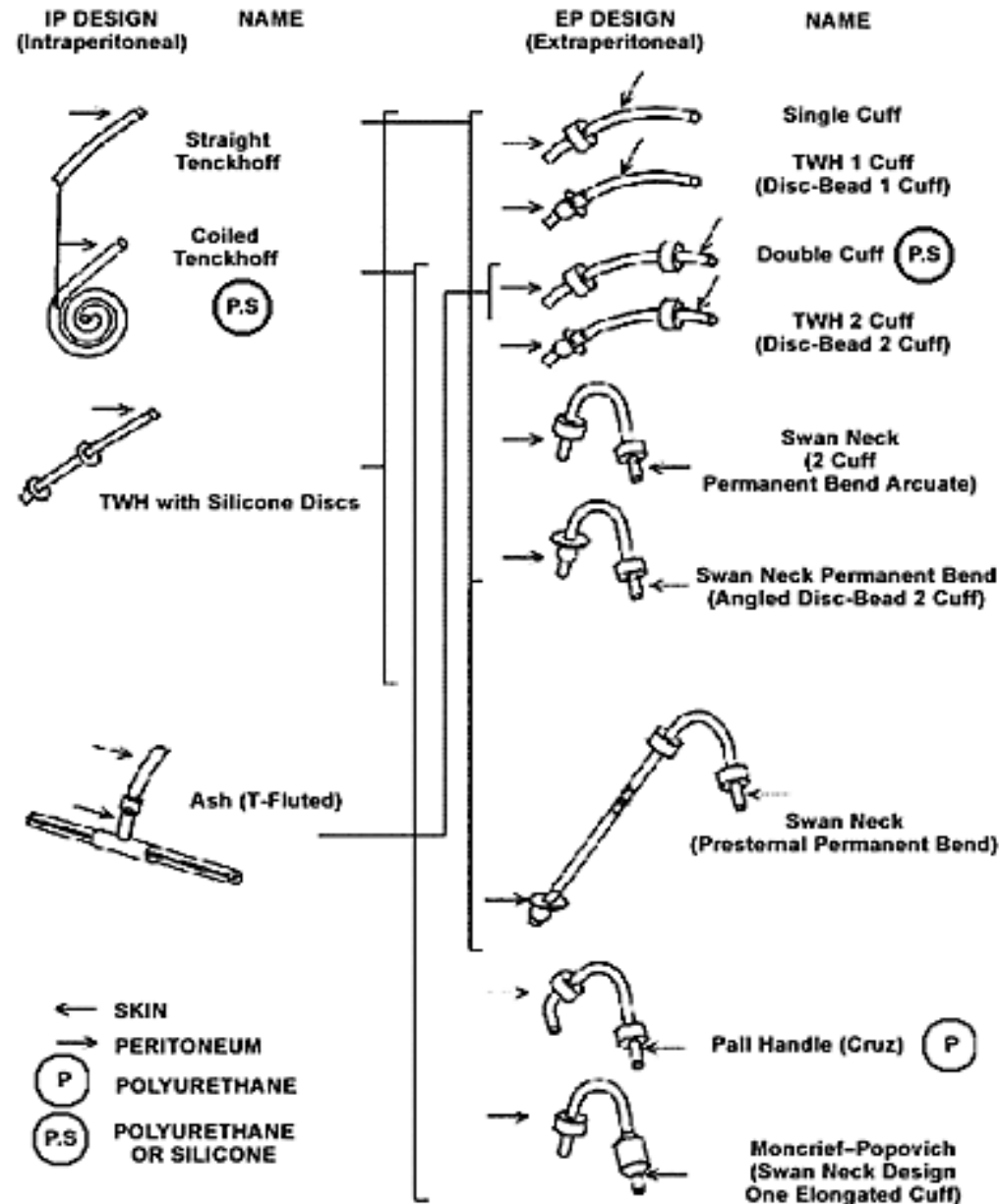
4-Higher catheter survival rate

5-Less infections



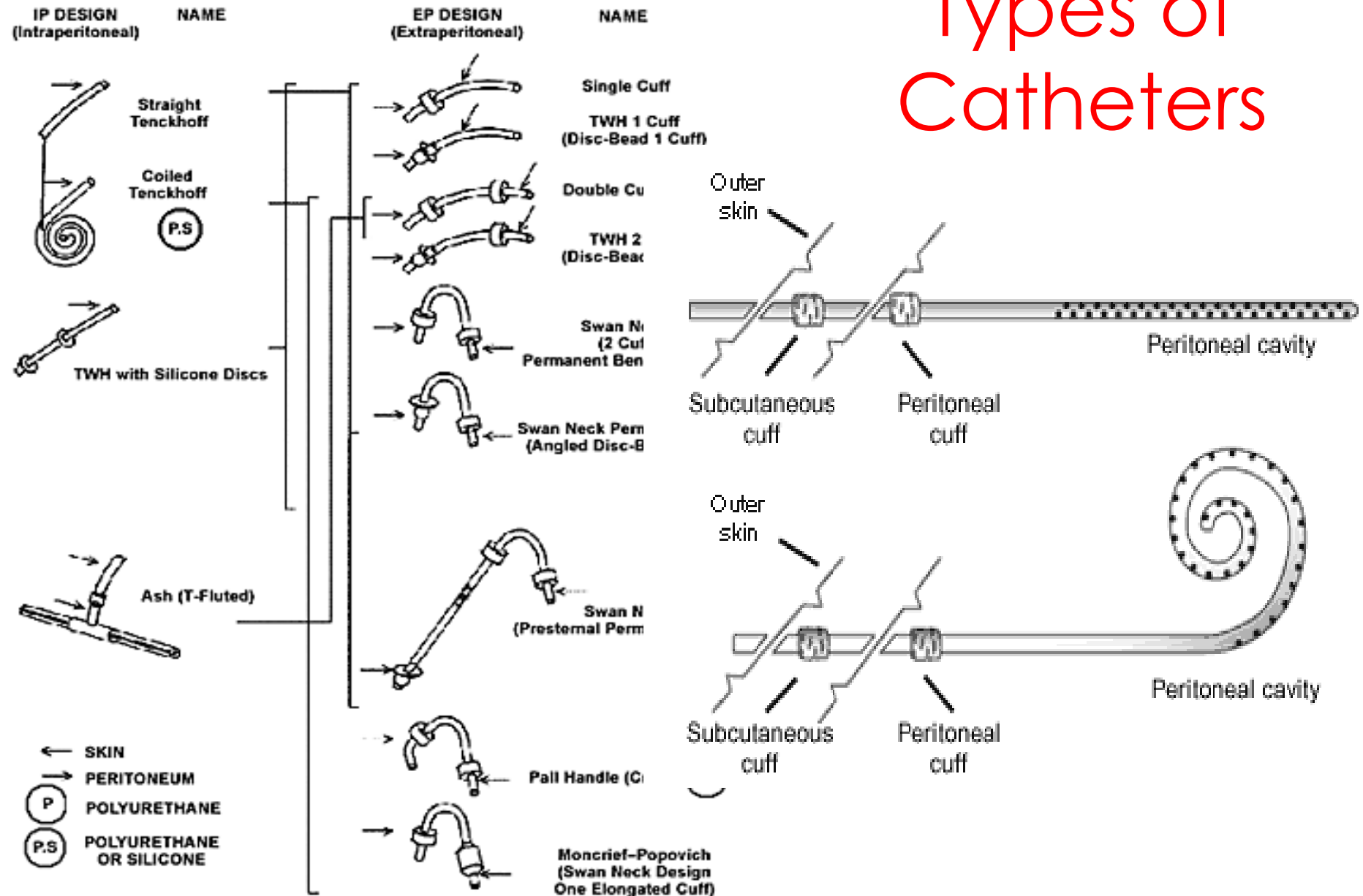
CURRENTLY AVAILABLE CHRONIC PERITONAEAL CATHETERS
COMBINATIONS OF IP AND EP DESIGNS

Types of Catheters



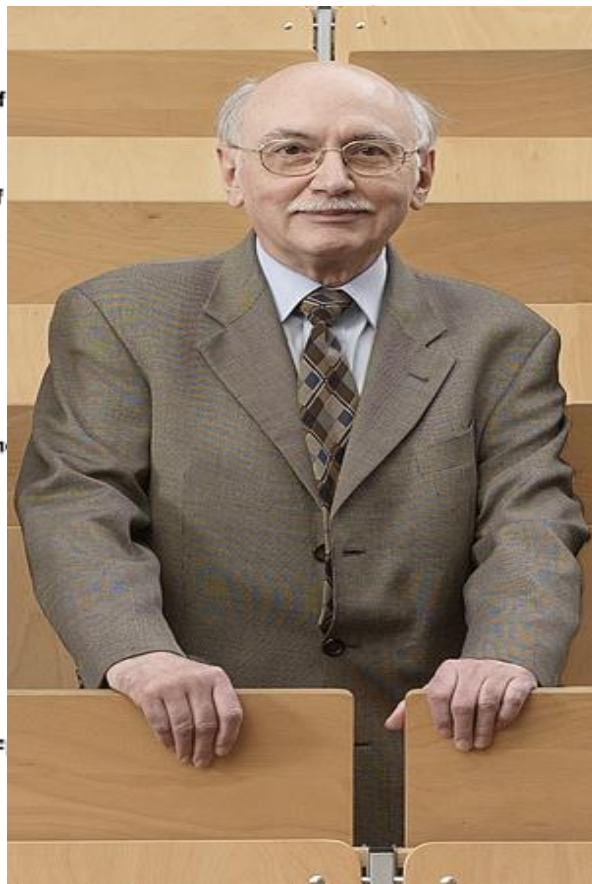
CURRENTLY AVAILABLE CHRONIC PERITONAEAL CATHETERS COMBINATIONS OF IP AND EP DESIGNS

Types of Catheters

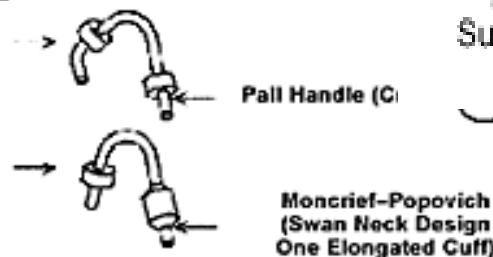
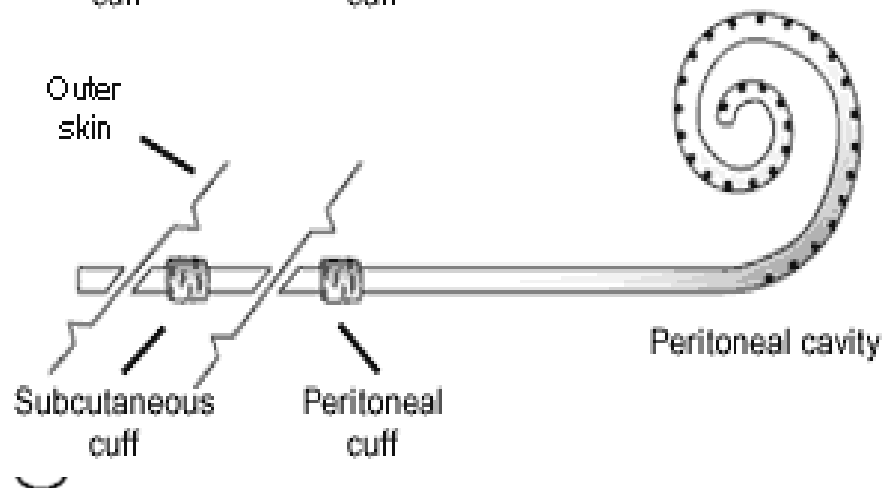
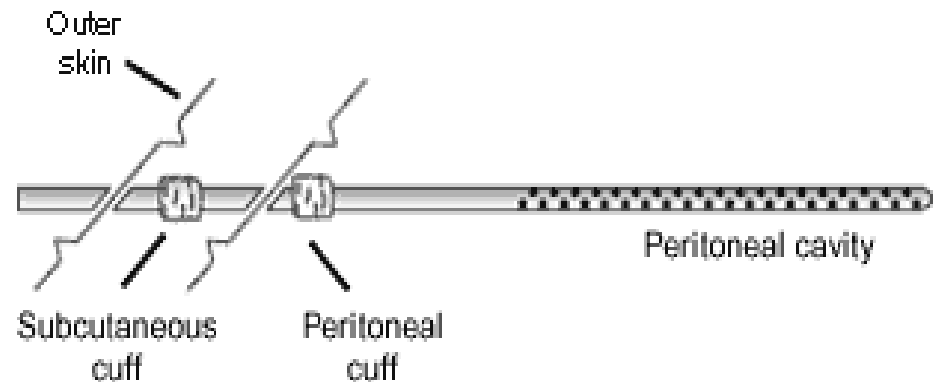


CURRENTLY AVAILABLE CHRONIC PERITONAEAL CATHETERS COMBINATIONS OF IP AND EP DESIGNS

Types of Catheters



Cuff
Cuff
(1 Cuff)

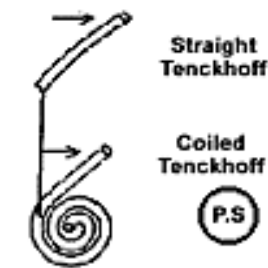


IP DESIGN
(Intraperitoneal)

NAME

EP DESIGN
(Extraperitoneal)

NAME



SKIN

PERITONEUM

POLYURETHANE

POLYURETHANE OR SILICONE

Type of catheters

commonly used catheters are
the double-cuff TCs (47 –65%)
swan-neck (26%)
1993 Italy Di Paolo catheters at 15.1% (self
located catheter)



**COMPARING THE INCIDENCE OF CATHETER-RELATED
COMPLICATIONS WITH **STRAIGHT AND COILED
TENCKHOFF CATHETERS** IN PERITONEAL DIALYSIS
PATIENTS—A SINGLE-CENTER PROSPECTIVE
RANDOMIZED TRIAL**

STRAIGHT Versus COILED TENCKHOFF CATHETERS

PRT recruited **189 PD** patients ESRD

Over 2 year

The patients were randomized

SC ($n = 99$) or a CC ($n = 90$)

*outcomes catheter related complication and
catheter survival*

Catheter Dysfunction

17.8% CC

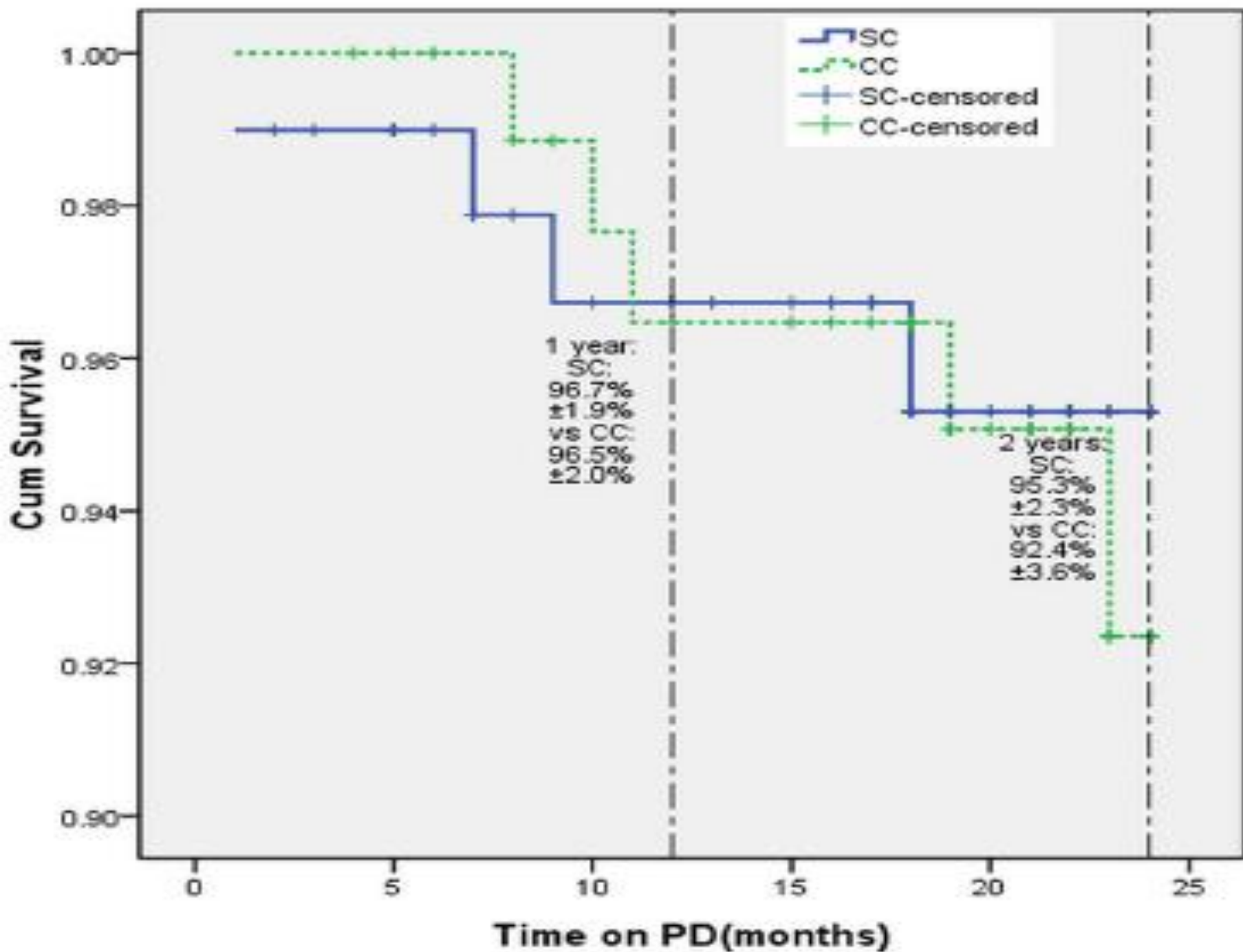
7.1% SC

Catheter migration and omnetal wrapping

Peritonitis rate

SC 0.22 equivalent to 1-54.5 patient-moths

CC 0.23 equivalent to 1-52.1 patient-moths



Catheter migration

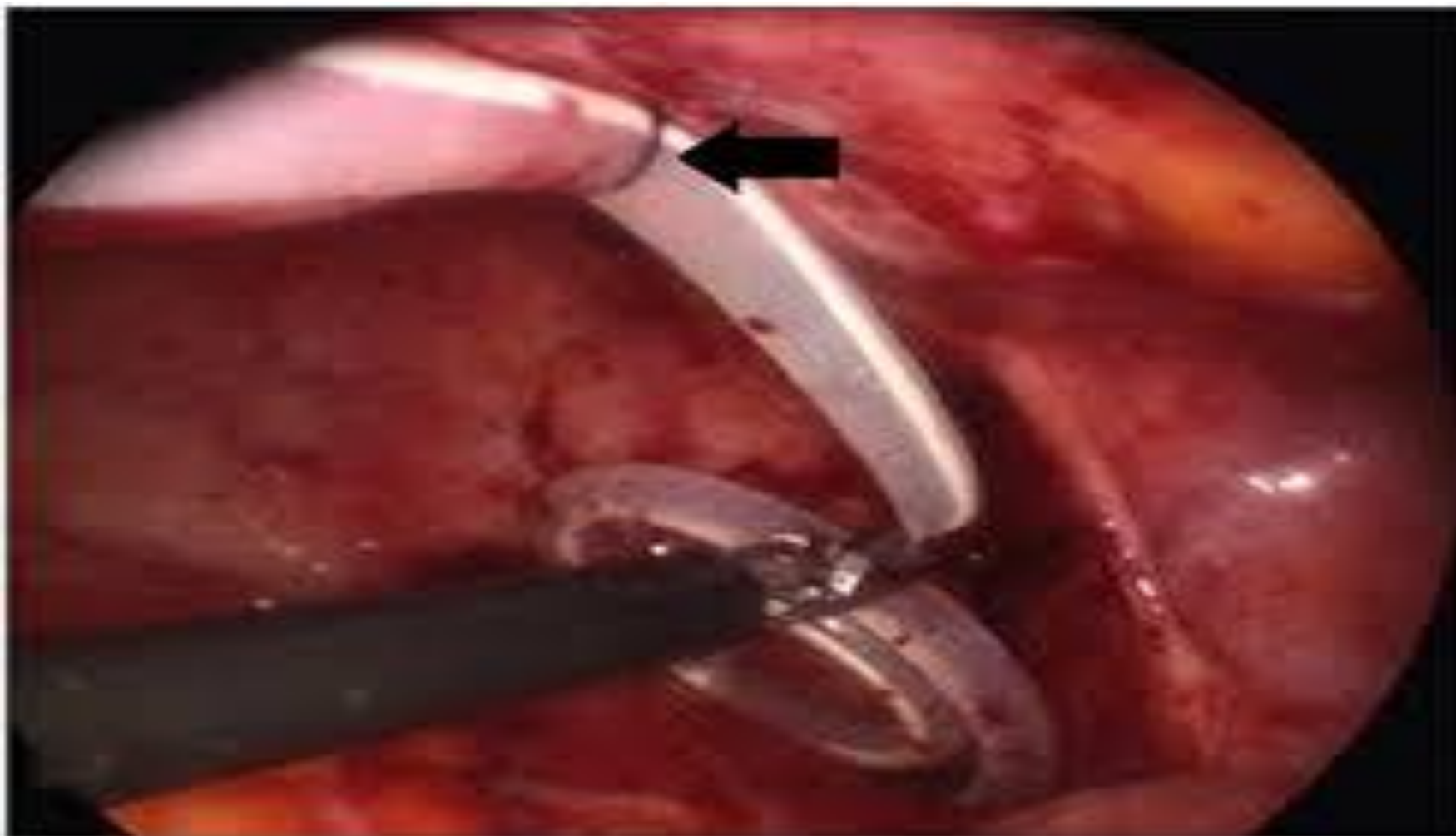
12.7% - 35%

PDI 2011

A SIMPLE METHOD TO PREVENT PERITONEAL DIALYSIS CATHETER TIP MIGRATION

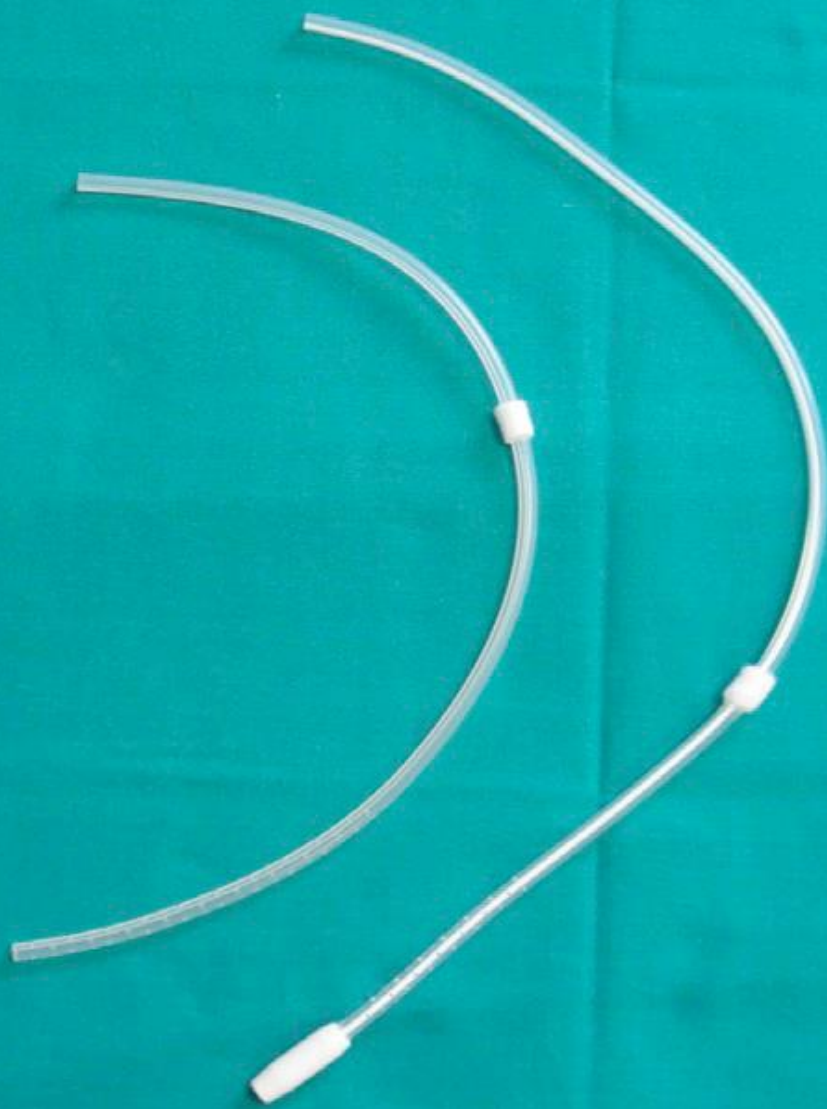
Wen-Ming Chen PDI 2007





PROSPECTIVE RANDOMIZED STUDY COMPARING A SINGLE-CUFF SELF-LOCATING CATHETER WITH A SINGLE-CUFF STRAIGHT TENCKHOFF CATHETER IN PERITONEAL DIALYSIS

Di paolo PDI 2015



PDI 2015

Incident patients were allocated to
SLC group ($n = 40$)
TC group ($n = 38$)

↓

Randomized $n=78$ patients

↙ ↘

Allocated to self-locating
catheter
 $n=40$ patients

Allocated to straight Tenckhoff
catheter
 $n=38$ patients

↓

Evolution

Continuous ($n=26$)
Transplantation ($n=6$)
Hemodialysis ($n=6$)
Death ($n=2$)
(1 myocardial infarction, 1 ictus)
Renal function recovery
($n=0$)

↓

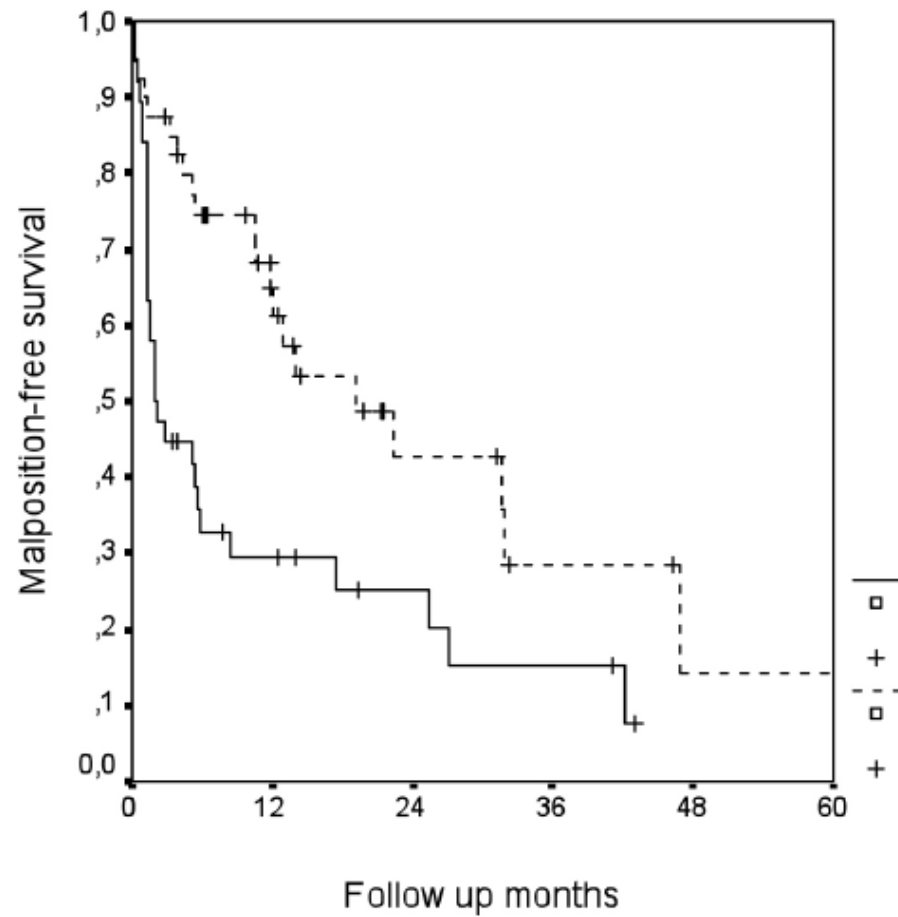
Evolution

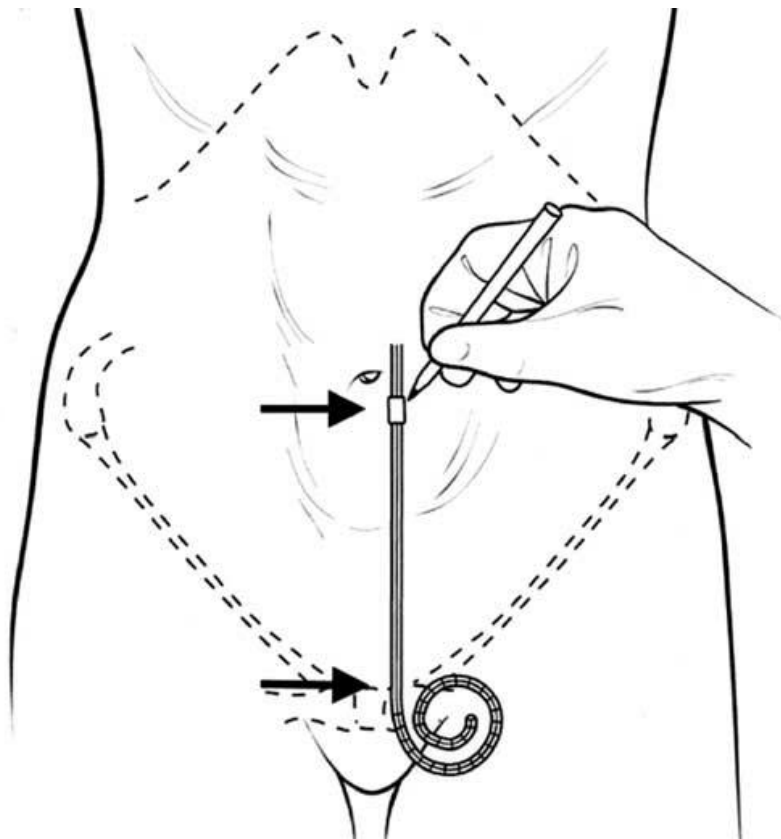
Continuous ($n=22$)
Transplantation ($n=9$)
Hemodialysis ($n=6$)
Death ($n=0$)
Renal function recovery
($n=1$)

Catheters were surgically inserted by the same surgical team of 2 surgeons using local anesthesia and sedation. prophylactic vancomycin (1 g IV) was given the day before surgery

	Pre period ^a	Post period ^a	SLC	Total period ^a TC	<i>p</i>
No complications	49	31	21	8	NS
Peritoneal bleeding	4	9	7	6	NS
Leakage	8	8	9	7	NS
Drainage failure	16	30	12	25	0.003 ^b
Hernia	0	7	7	7	NS
Peritonitis	0	57	31	26	NS
Exit-site infection	3	11	7	7	NS
Cuff extrusion	0	0	0	0	NS







PERITONEAL INFLAMMATION AFTER TWENTY-WEEK EXPOSURE TO DIALYSIS SOLUTION: EFFECT OF SOLUTION VERSUS CATHETER—FOREIGN BODY REACTION

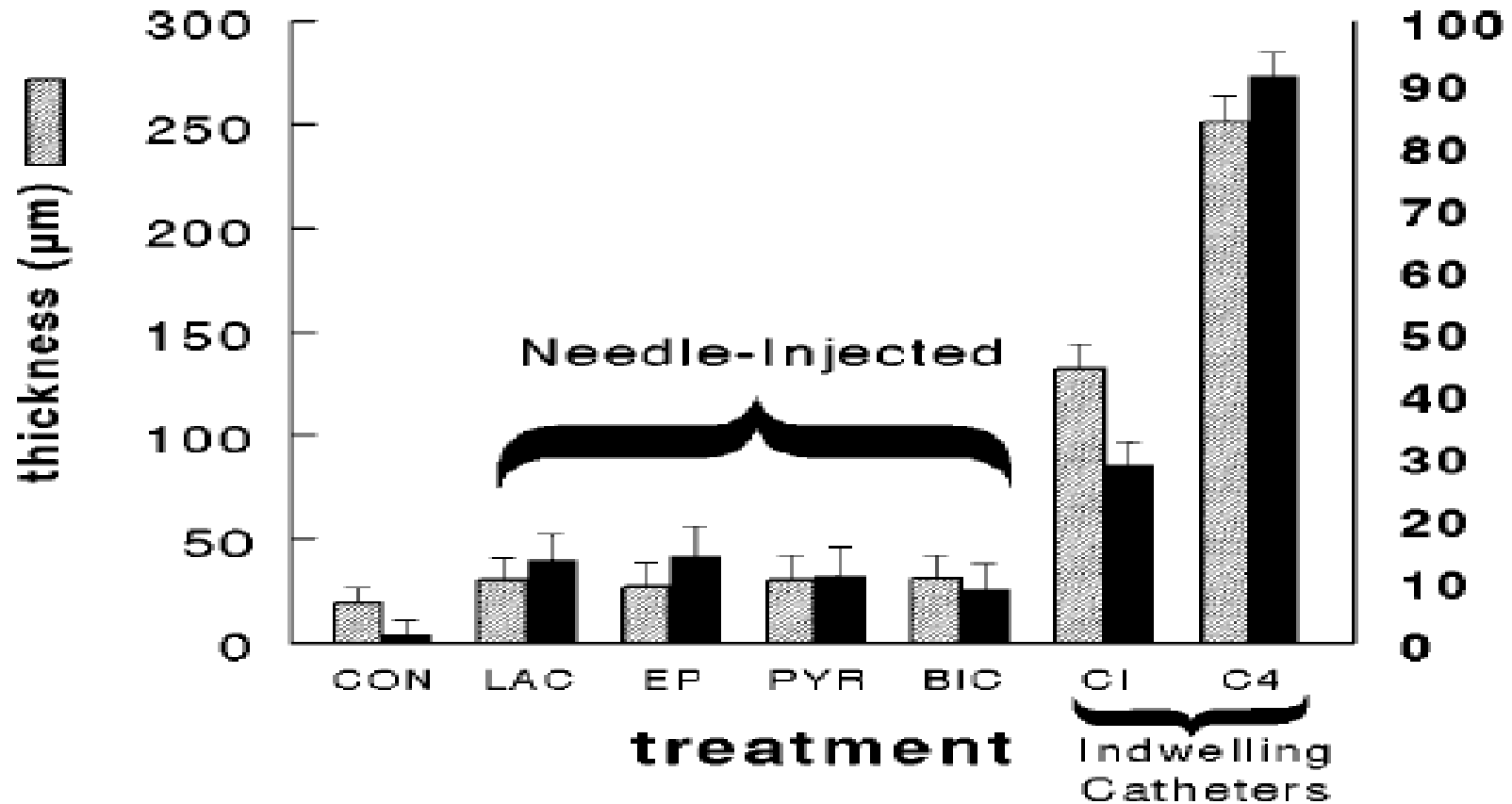
Effect of catheter on peritoneum membrane

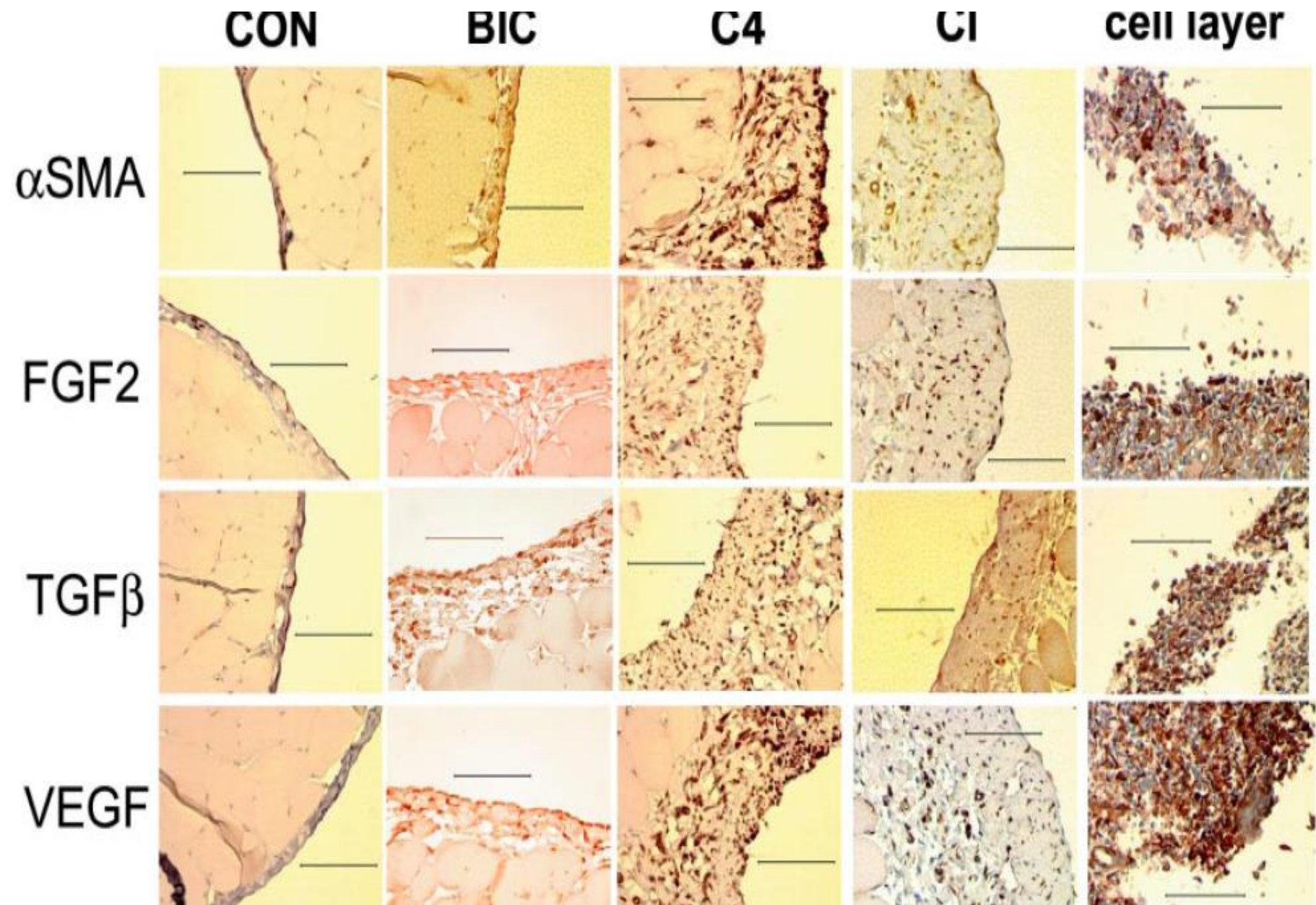
Four hypertonic solutions (30 – 40 mL) were injected daily via needle and syringe over 20 weeks in 4 groups of rats:

4.25% (LAC), LAC plus pyridoxamine (PYR), LAC plus ethyl pyruvate (EP), and a biocompatible 4% dextrose solution (BIC)

Two groups received catheters: a non-injected 4-week catheter group (C4) and a group injected for 20 weeks with the BIC solution (CI). Control animals (CON) were not injected

Effect of catheter on peritoneum membrane





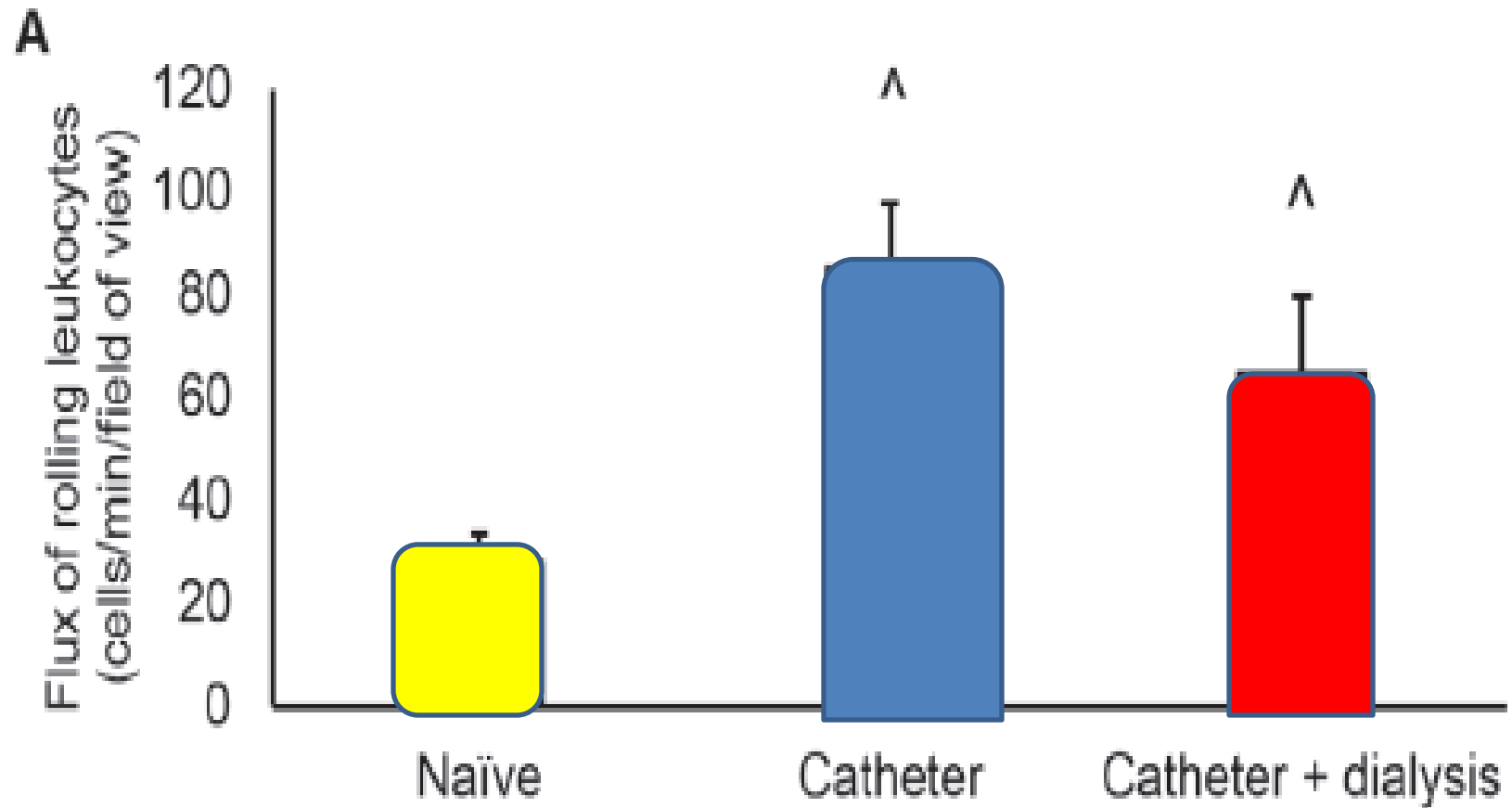
PERITONEAL DIALYSIS CATHETER INCREASES LEUKOCYTE RECRUITMENT IN THE MOUSE PARIETAL PERITONEUM MICROCIRCULATION AND CAUSES FIBROSIS

The objective of this study was to examine the

Effects of a conventional dialysis solution

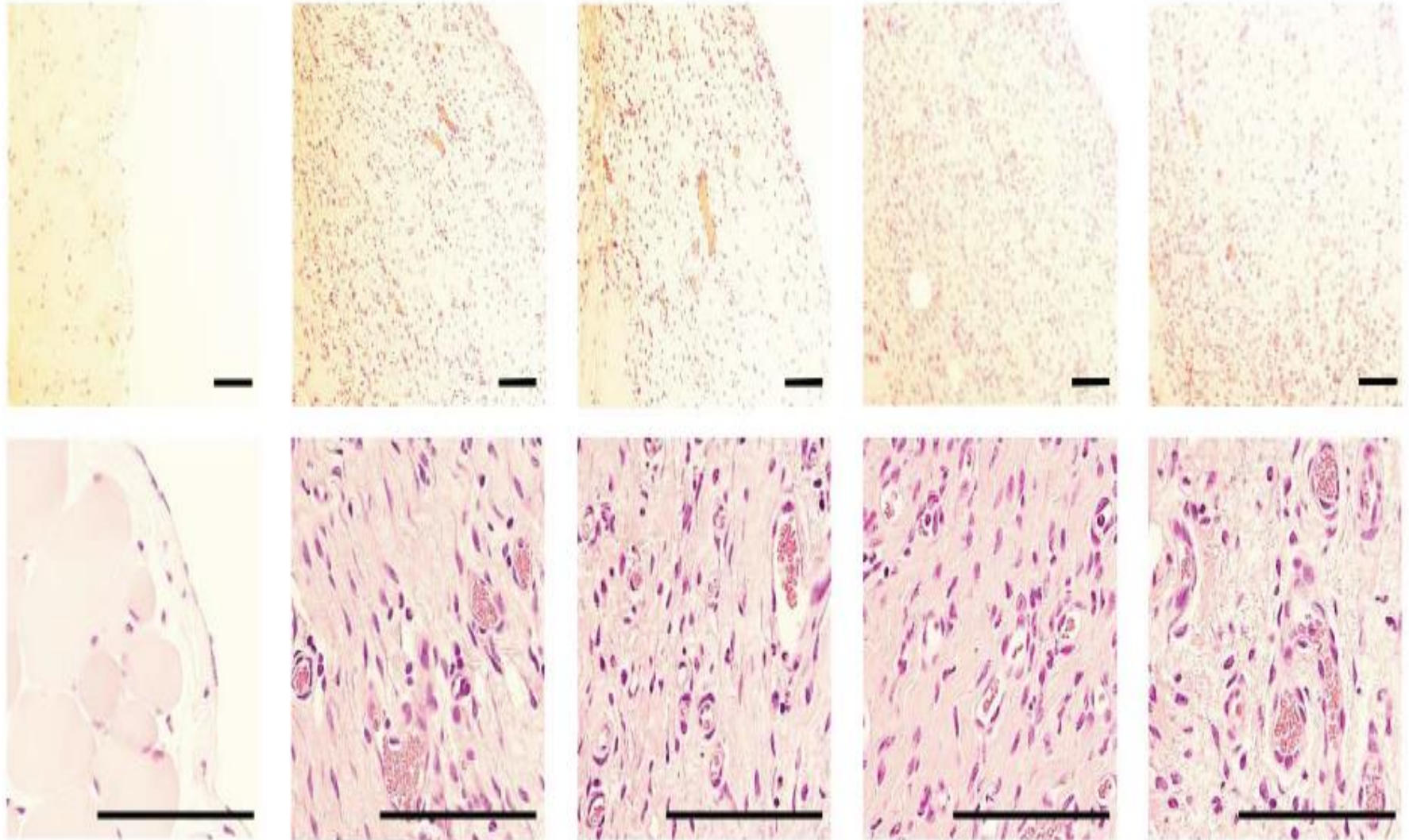
Peritoneal catheter without dialysis

**On leukocyte-endothelial cell interactions in the
microcirculation of the parietal peritoneum over 8 weeks**



Naïve	Catheter	Catheter	Catheter + dialysis	Catheter + dialysis
Left upper quadrant	Left upper quadrant	Left lower quadrant	Left upper quadrant	Left lower quadrant

A



conclusion

The peritoneal catheter implant increased leukocyte rolling and extravasation, peritoneal fibrosis and vascularization in the parietal peritoneum independently from the dialysis solution treatment.

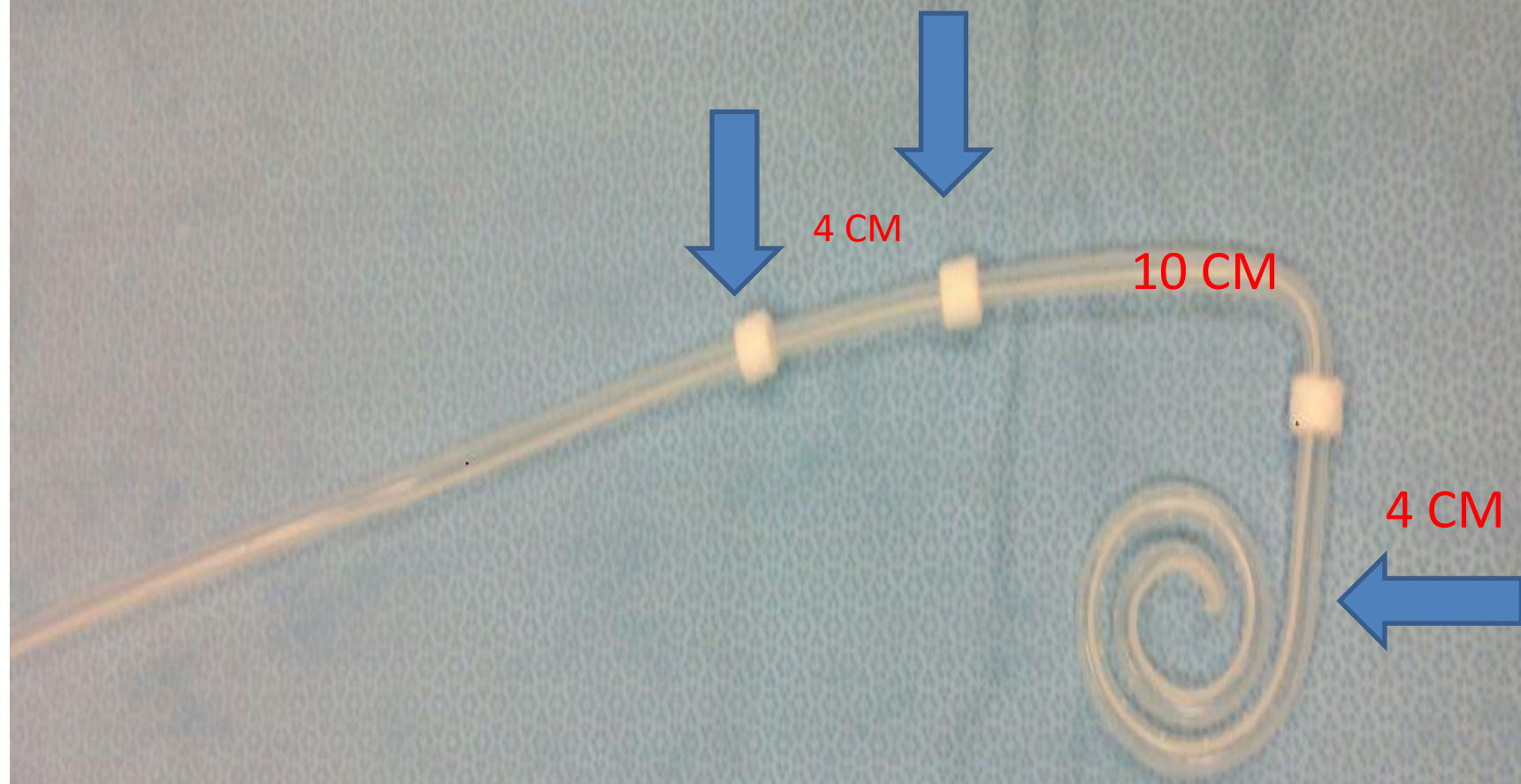
The Saudi Peritoneal Dialysis Catheter

Modified Catheter with short intra peritoneal segment and New Technique Farewell to Catheter Migration

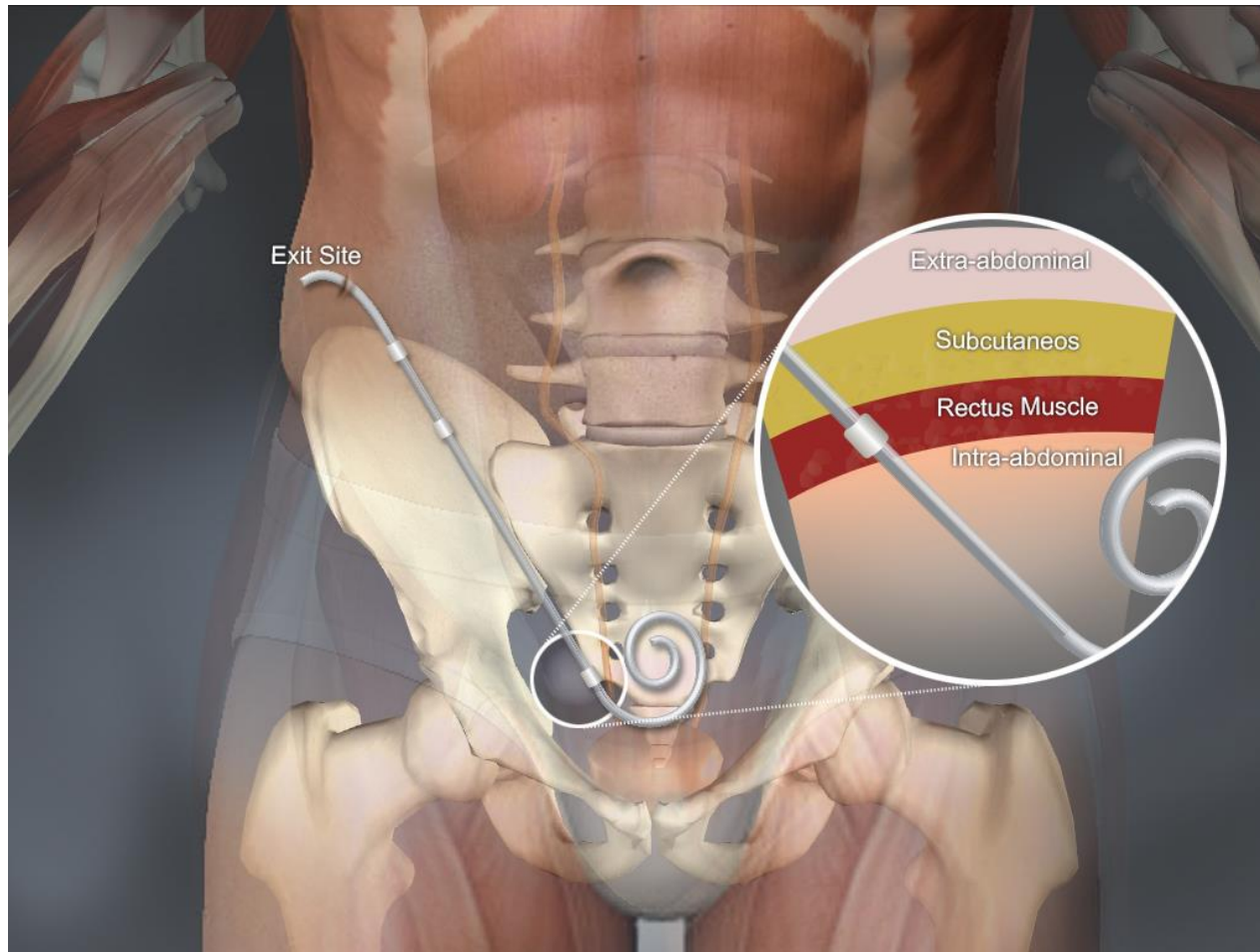
Alhwiesh SJKDT 2016

Objective

To introduce our new, triple-cuff peritoneal dialysis (PD) catheter with the low-entry technique and to study its impact on catheter survival and mechanical and infectious complications



Saudi Peritoneal Dialysis Catheter



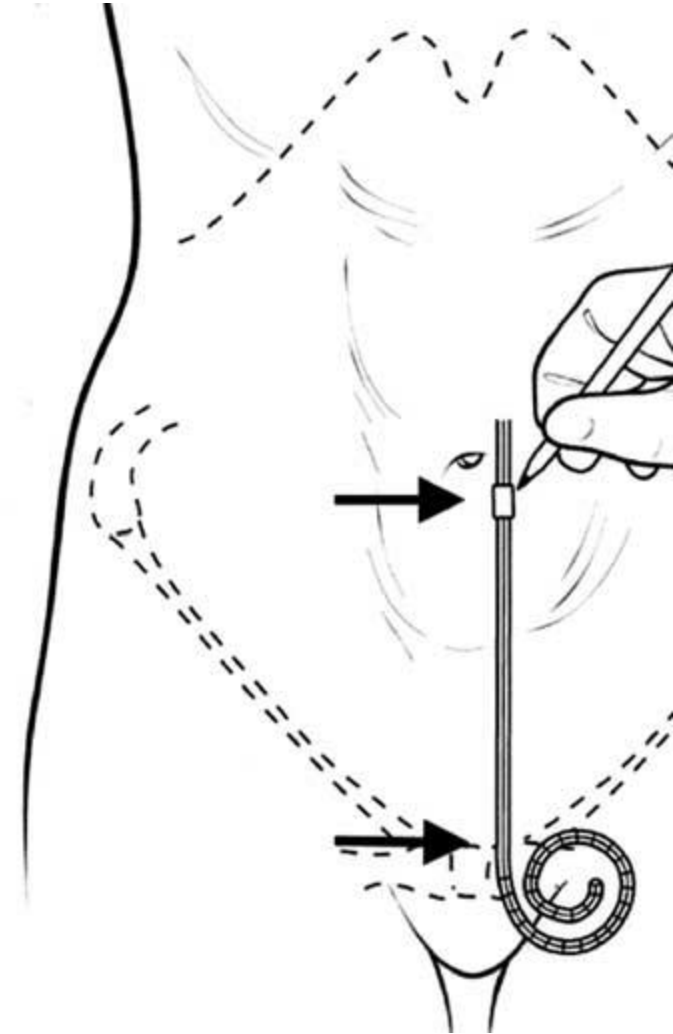
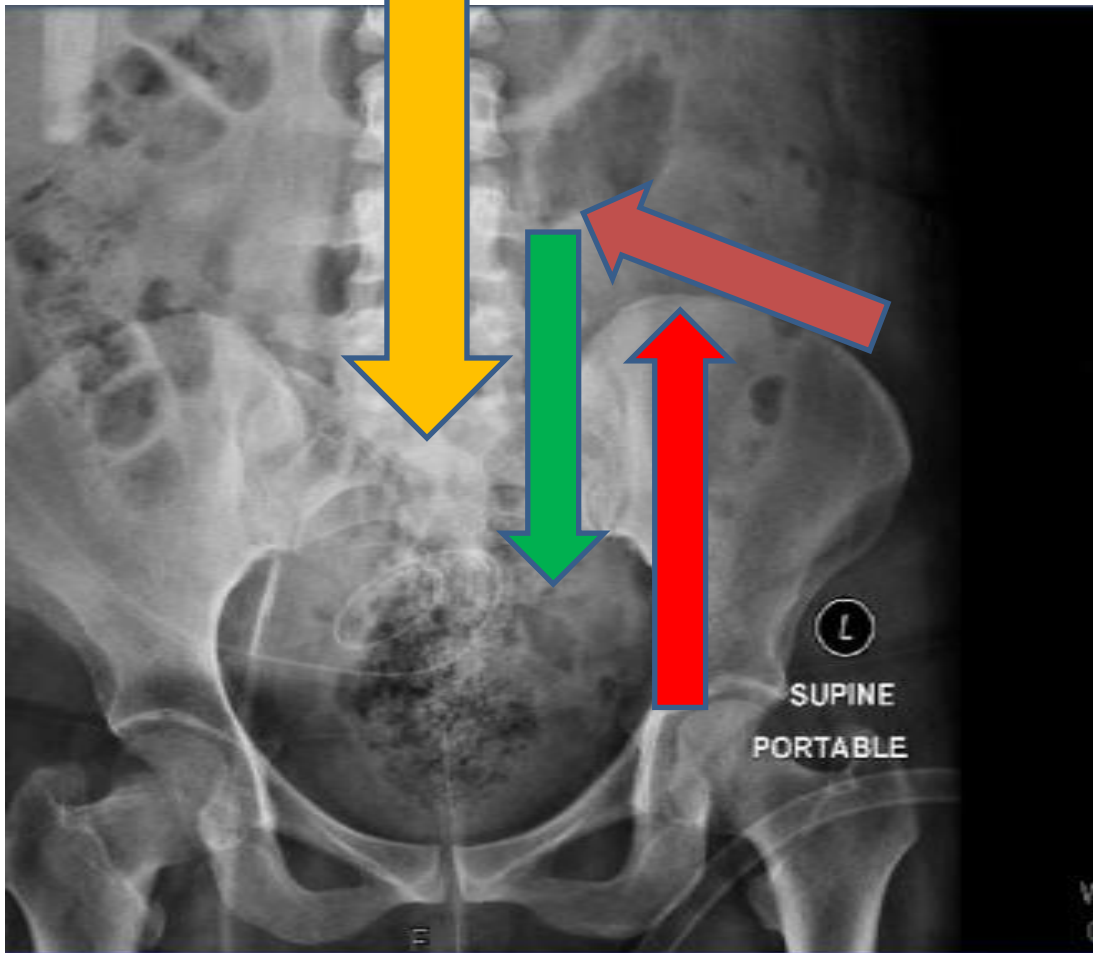


Saudi Peritoneal Dialysis Catheter with short intra-peritoneal segment



Alhwiesh SJKDT 2016

Saudi Peritoneal Dialysis Catheter



- RPS in King Fahd University Hospital AlKhober Saudi Arabia over a period of 18 months.

The new catheter and technique were used in 36 incident PD

conventional double-cuff PD Tenckhoffcatheter with the classic approach was used in 37 patients

Demographic Data

	Saudi catheter	Tenckhoff catheter	P-value
Age	54	50	NS
Gender Female/male	11/25	13/24	NS
DM	63.4%	58%	NS
BMI	29.6	30	NS
GFR	8.2	8.4	NS
S Cr	945	856	NS

Alhwiesh SJKDT 2016

	TC	SC	P-Value
Fill time (min)	13.2±2.2	7.1±1.2	< 0.01
Drain time (min)	14.4±2.1	7.3±1.4	< 0.01
Kt/V	1.78	2.2	<0.01

- Filling



- Drainage

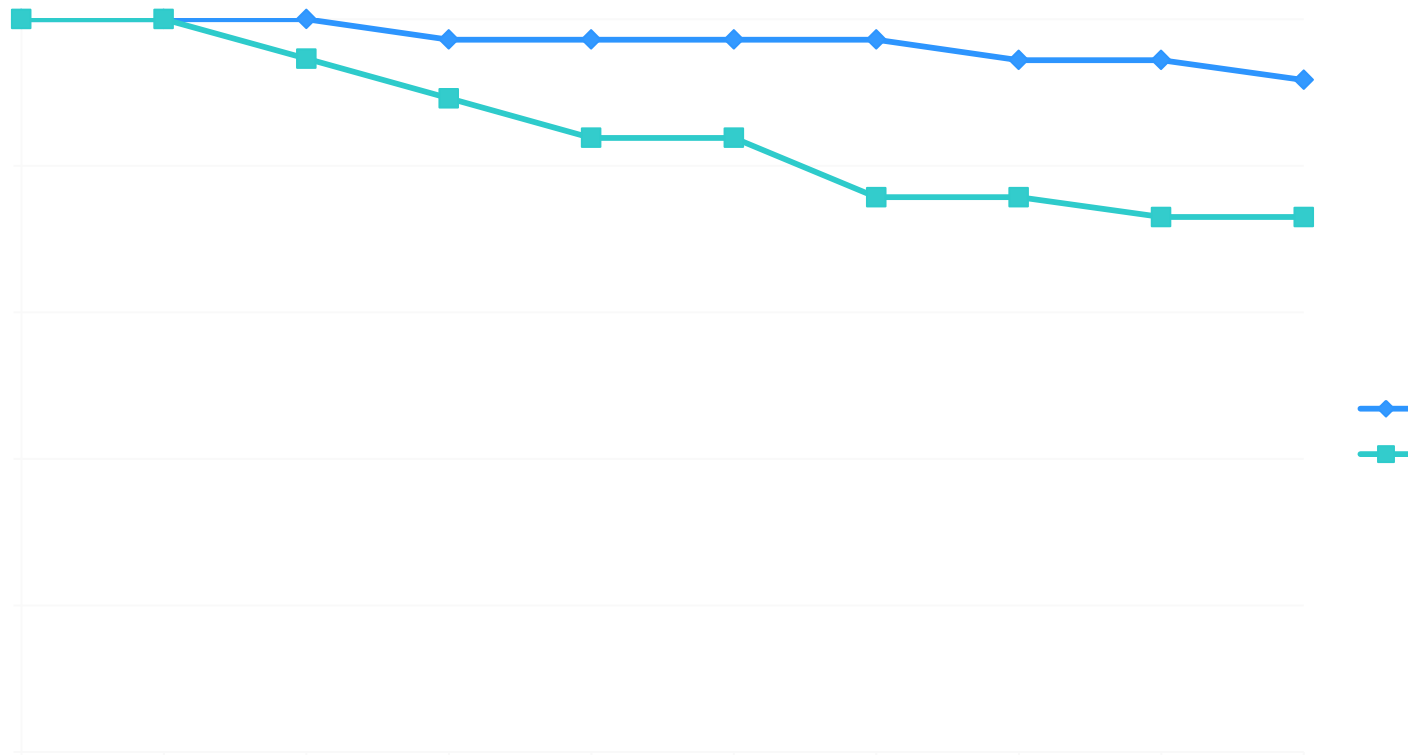


Technical Complications

	SC	TC	P-value
Bowel perforation	0%	0%	
Hemorrhage	0%	0%	
Poor drainage	1(2.8%)	11(29.7%)	< 0.01
Omental wrapping	1(2.8%)	6(16.2%)	< 0.01
Catheter migration	0%	6(16.2%)	< 0.01
leakage	2(5.6%)	3(8.1%)	NS
Catheter replacement	1 (2.8%)	5 (13.5%)	<0.01

Infectious complications at the end of the study

	SC	TC	P-value
Exit-site infection	4(11.1%)	5 (13.5%)	NS
Tunnel infection	1 (2.8%)	1 (2.7)	NS
Peritonitis	2 (2.8%)	6 (16.2%)	<0.01
Catheter survival	33(91.7%)	27 (73%)	<0.01
		Alhwiesh SJKDT 2016	



Alhwiesh SJKDT 2016

Saudi Peritoneal Dialysis Catheter

Compared with the conventional Tenckhoff PD catheter, our triple cuff PD catheter demonstrated

- 1-Zero rate of catheter migration
- 2- Dialysis adequacy improved because of shortened fill and drain times
- 3- Catheter survival exceeded the ISPD recommendation
- 4- Peritonitis rate was very low.

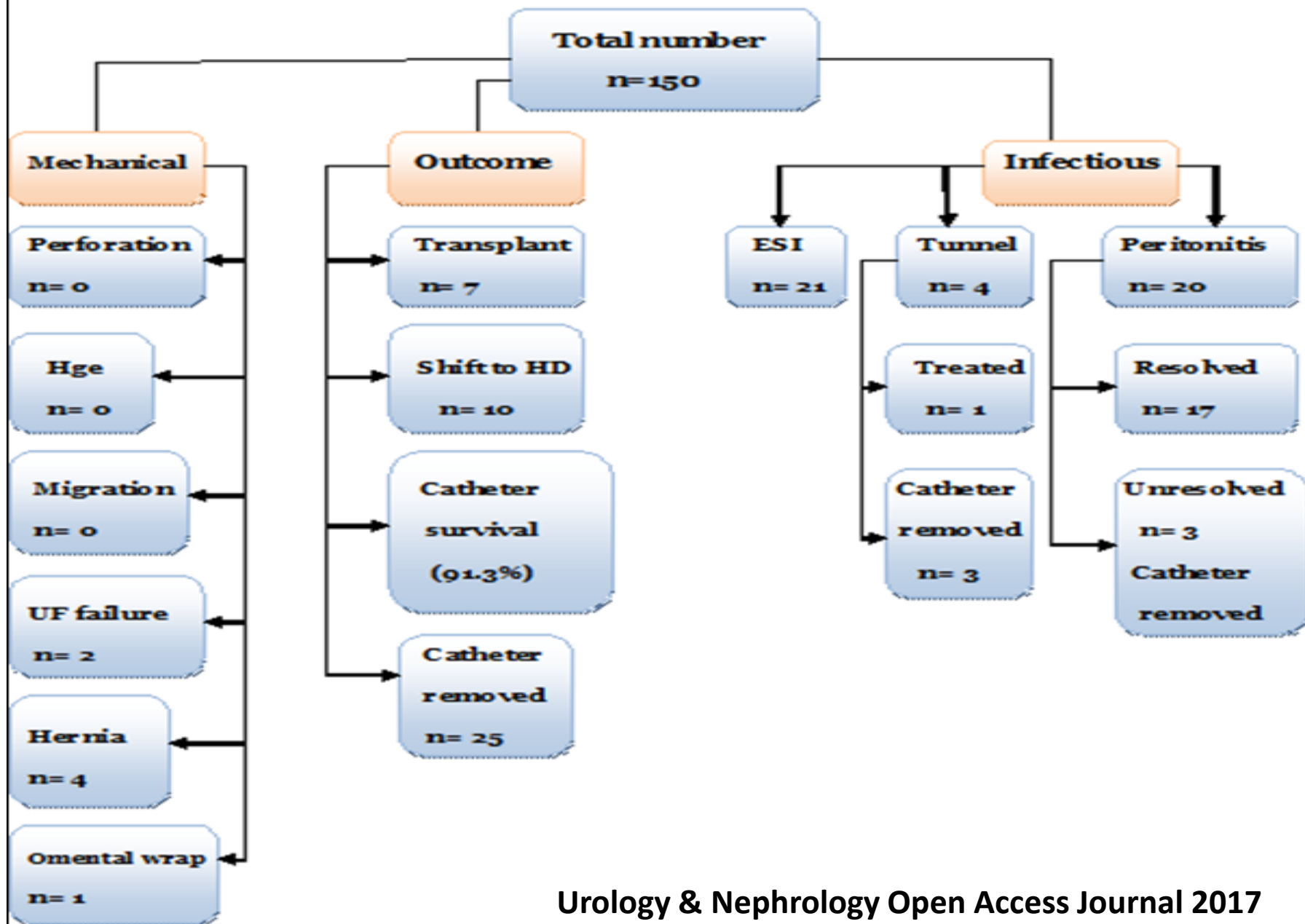
A Novel three Cuff Peritoneal Dialysis Catheter with Low Entry Technique: Three Years Single Center Experience

●

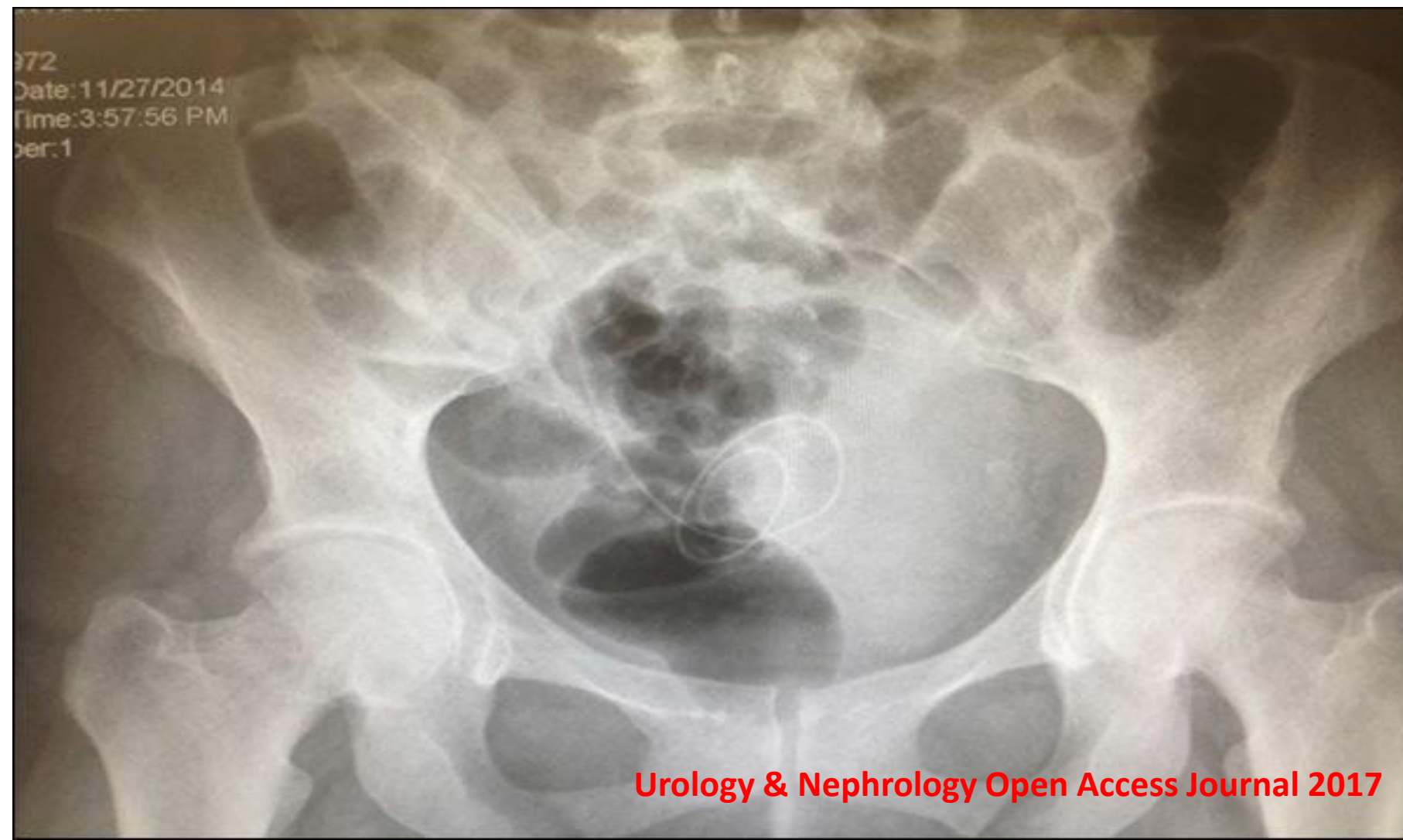
Objective

To share our 3-year experience with the new, three-cuff peritoneal dialysis (PD) catheter with the low-entry technique and to study its effect on infectious and non-infectious complications as well as its impact on catheter survival.

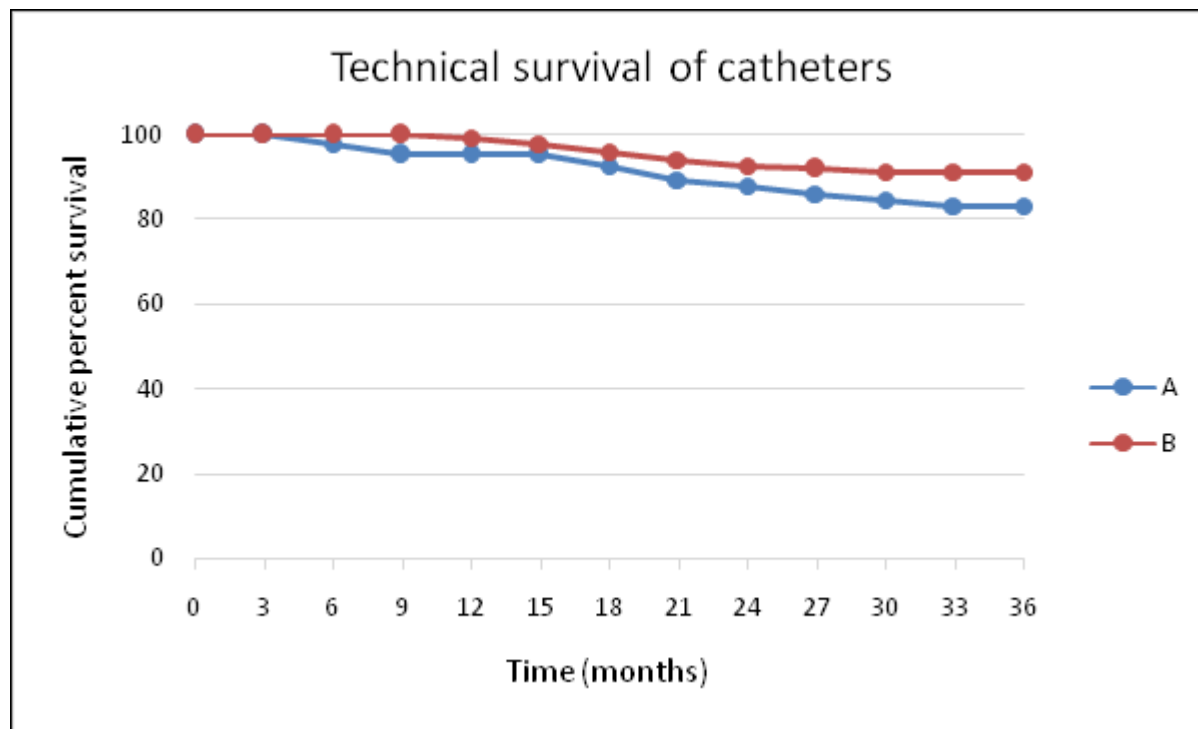
This is an observational study which was carried out in a university hospital over 3 years. The study involved 153, three-cuff PD catheter insertions in 150 incident PD patients. The study was carried out in our PD center and extended from December, 2012 till January 2016 with a mean follow-up period of 15 months.







Complication	n(%)
Bowel perforation	0 (0.0)
Hemorrhage*	0 (0.0)
Ultrafiltration failure	2 (1.3)
Omental wrapping	1 (0.7)
Catheter migration	0 (0)
Early leakage**	10 (6.7)
Late leakage	3 (2.0)
Transient obstruction	6 (4.0)
Catheter replacement	3(2.0)



Peritonitis rate in our center prior to our catheter was
0.2%

equivalent to 1 episode per 60 patient–months

With our new 3-cuff PD catheter and new technique the rate of peritonitis was as low as 0.106 per patient-year equivalent

1 episode of peritonitis per 104 patient-months

far exceeding the ISPD recommendations and superior to the previous reports

year	month	No.Case	per / m	per / y
2005	15	1	15	0.8
2006	204	6	34	0.357
2007	566	15	37.7	0.3185
2008	1393	22	63.32	0.189
2009	1862	29	64.21	0.187
2010	2620	37	70.8	0.1695
2011	3343	41	81.54	0.1472
2012	4152	50	83.04	0.145
2013	5004	58	86.3	0.139
2014	6104	74	82.49	0.146
2015	7368	84	87.71	0.137
2016	8915	94	94.84	0.127
2017	10705	104	102.93	0.11
2018	11035	106	104.1	0.11



الجمعية الوطنية للتشخيص والتشخيص
الجمعية الوطنية للتشخيص والتشخيص

Peritonitis Rate at KFUH Saudi Arabia

We did it
1 to 104 per patient moths

الحملة التوعوية بالكلية وصحة المرأة



www.wkd.iau.edu.sa البوابة الرسمية للحملة



conclusion

The ideal peritoneal dialysis catheter

- 1- Migration
- 2- Infection
- 3- Omental wrapping
- 4- Excellent catheter survival
- 5- Less irritant to peritoneum
- 6- Improve adequacy of dialysis
- 7- Reliable and Cost effective

conclusion

Catheter with long intra-peritoneal segment causes peritoneal membrane inflammation and more omental wrapping

conclusion

Need to share experience and knowledge among the other center in the country

It is time for multi-center, prospective PD studies



