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## **PD23-12 - Near-infrared fluorescence imaging of ureters with intravenous indocyanine green during radical cystectomy to prevent ureteroenteric anastomotic strictures**

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## Introduction



Radical  
cystectomy with  
urinary diversion



Ureteroenteric  
anastomotic  
stricture (UAS)



1.5 to 17.6%  
7 to 25 months



## Introduction



**Silent  
Hydronephrosis**



**Loss of renal  
function**



**Obesity  
Radiation  
Smoking  
Others**



## Introduction



Ischemia  
Scar formation



Quantifying  
vascularity in  
real time



Near infrared  
fluorescence  
imaging



## Introduction



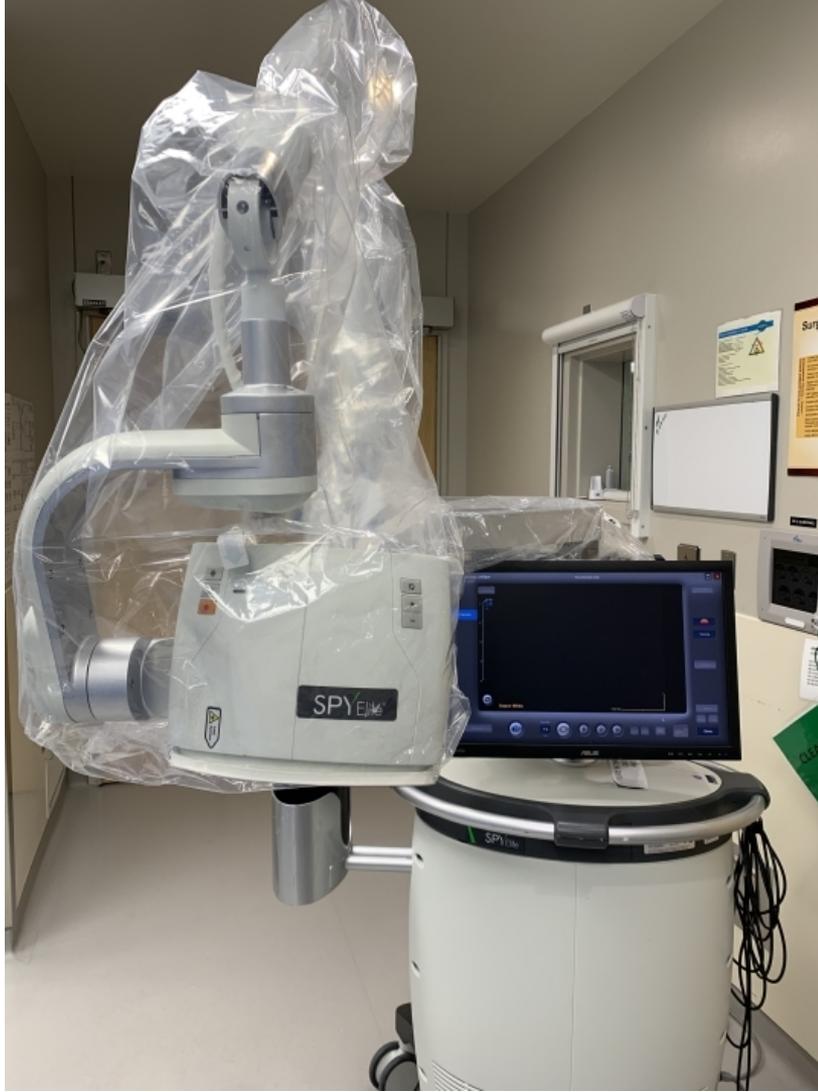
Indocyanine  
green (ICG)

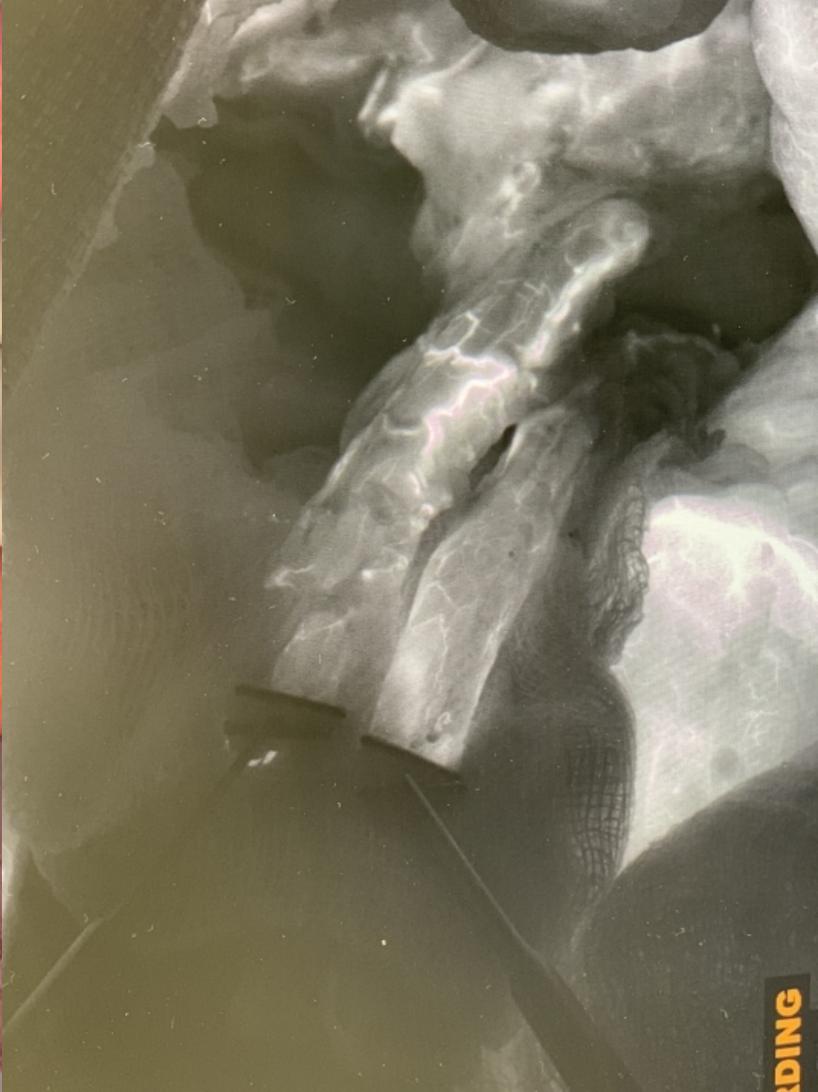
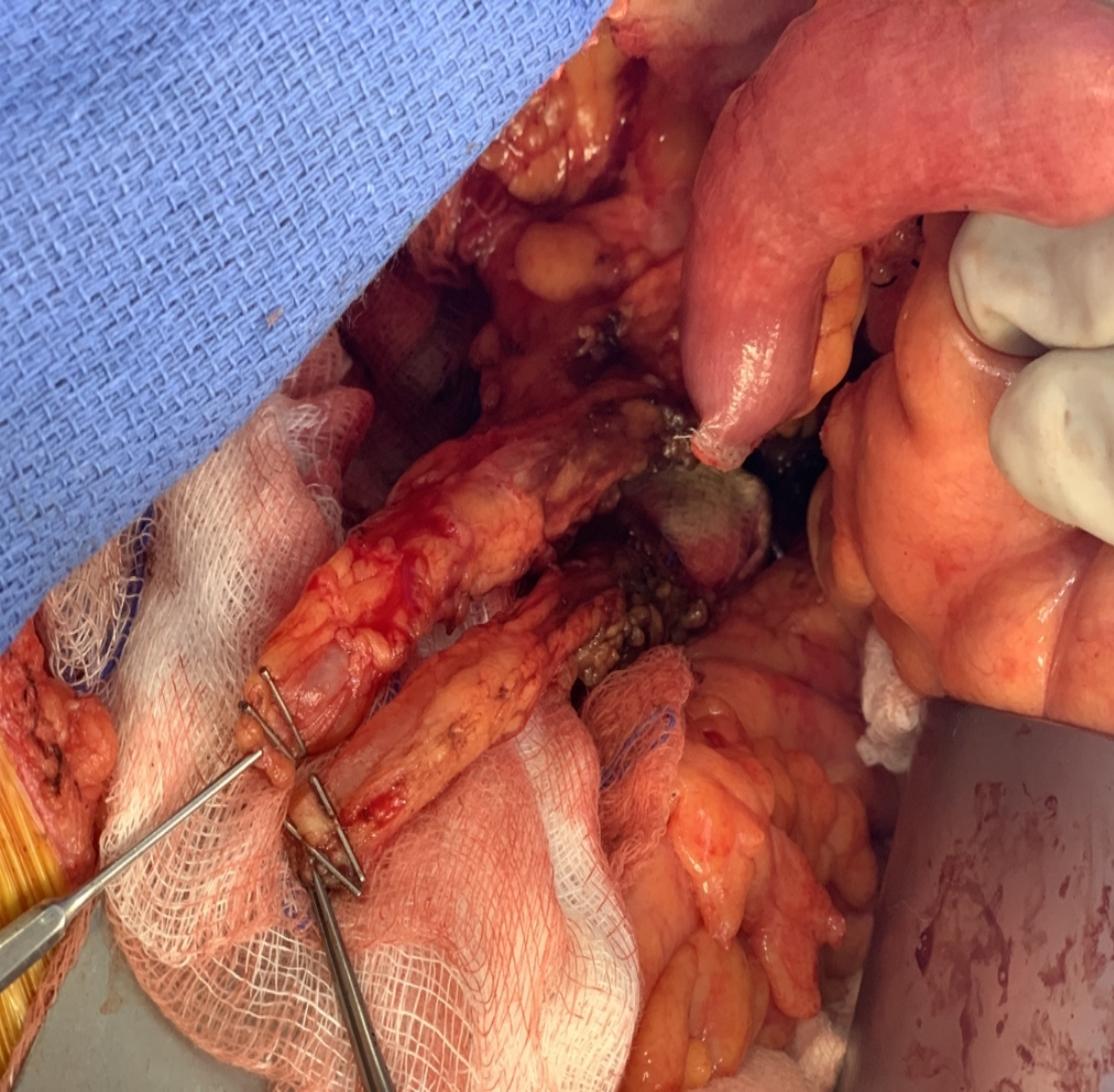


Intravenous  
98% intra-  
vascular



Fluorescence in  
<1min  
Tissue perfusion





ENDING



## Methods



Ureteral  
vascularity =  
decreased risk  
of UAS



Retrospective  
2 years  
Single surgeon



ICG and non-  
ICG cohorts



## Methods



CT/MRI every 6  
months for 5  
years



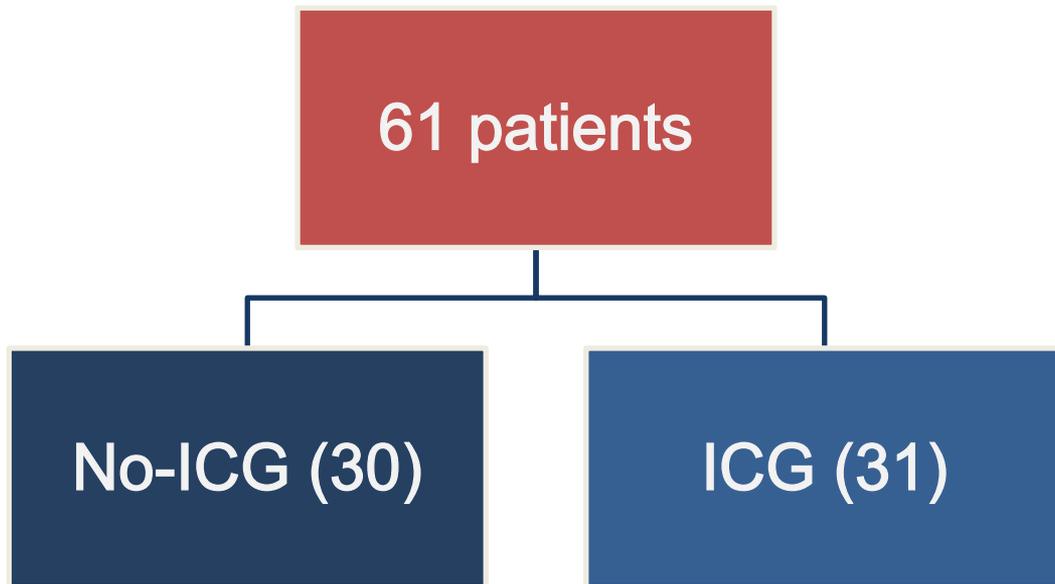
Hydronephrosis  
Loopogram  
Lasix renal scan



Stent  
Surgical revision  
Surveillance (if  
<10% function)



## Results



Baseline Risk Factors	Total, N=61, n (%)	No ICG, N=30, n (%)	ICG, N=31, n (%)	p-value
Age, median (Q1, Q3)	70.5 (62.6, 74.1)	71.6 (64.9, 74.4)	67.5 (59.2, 73.5)	0.147
BMI, median (Q1, Q3)	28.7 (25.4, 32)	29.4 (26.4, 32)	28.3 (25.4, 32.2)	0.513
Gender: Male	48 (79)	22 (73)	26 (84)	0.315
Race: Caucasian	57 (93)	29 (97)	28 (90)	0.612
Smoking: Former or Current	15 (25)	10 (33)	5 (16)	0.119
Hypertension	38 (62)	15 (50)	23 (74)	0.051
Diabetes	10 (16)	5 (17)	5 (16)	1.000

Baseline Risk Factors	Total, N=61, n (%)	No ICG, N=30, n (%)	ICG, N=31, n (%)	p-value
Coronary artery disease	10 (16)	7 (23)	3 (10)	0.182
Infrarenal AAA	7 (11)	5 (17)	2 (6)	0.255
Peripheral vascular disease	2 (3)	2 (7)	0 (0)	0.238
History of Pelvic Radiation	6 (10)	3 (10)	3 (10)	1.000
Ureteral Procedure -				
Ureterolysis	1 (2)	0 (0)	1 (3)	0.485
Ureteroscopy	7 (11)	2 (7)	5 (16)	
Other	4 (7)	2 (7)	2 (6)	
None	49 (80)	26 (87)	23 (74)	

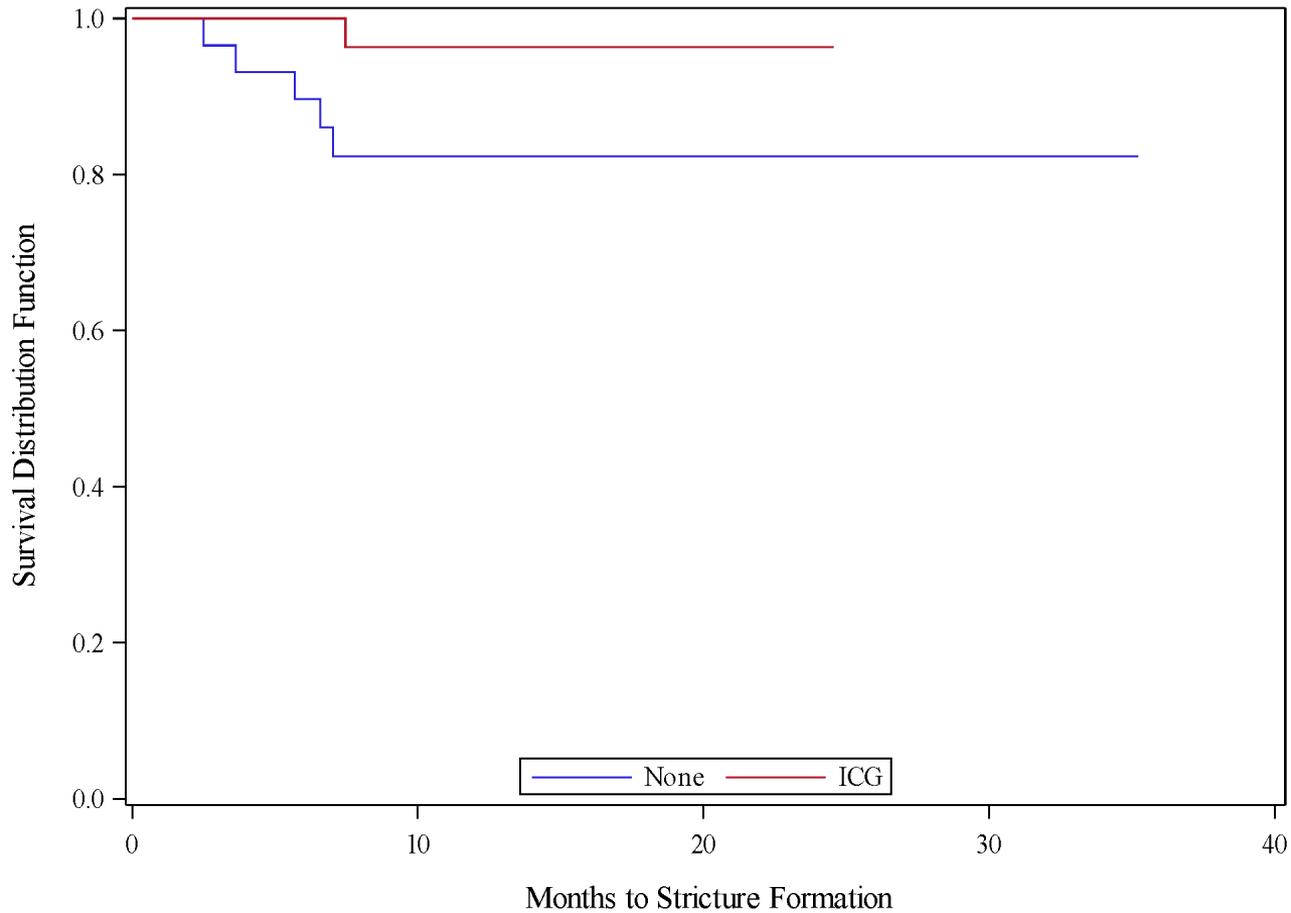
Baseline Risk Factors	Total, N=61, n (%)	No ICG, N=30, n (%)	ICG, N=31, n (%)	p-value
Neoadjuvant Chemotherapy	32 (52)	16 (53)	16 (52)	0.893
Length of Case (mins), Median (Q1, Q3)	398 (368, 442)	398.5 (368, 446)	398 (368, 433)	0.876
Urinary Diversion: Ileal conduit	43 (72)	21 (72)	22 (71)	0.901

No patient received pelvic radiation post-operatively

	Total, N=61, n (%)	No ICG, N=30, n (%)	ICG, N=31, n (%)
Follow up (months), median (Q1, Q3)	17.2 (11.3, 24)	23.2 (7, 29.3)	15.8 (12.2, 18.1)
Ureteroenteric anastomotic strictures	6 (9.8)	5 (16.7)	1 (3.2)
Time to stricture (months), median (Q1, Q3)		5.7 (3.6, 6.6)	7.5

The median length for the segment of resected ureter due to poor perfusion in the ICG cohort was -  
1.3cm on the left  
1.6cm on the right

### Time to Stricture Formation





## Results



All UAS were  
right-sided



2 – surgical  
revision (incl.  
ICG stricture)



2 – NT/stent  
2 – no  
intervention,  
renal atrophy



## Robotics and Laparoscopy



# Use of indocyanine green to minimise uretero-enteric strictures after robotic radical cystectomy

Nariman Ahmadi , Akbar N. Ashrafi , Natalie Hartman, Aliasger Shakir, Giovanni E. Cacciamani , Daniel Freitas, Nieroshan Rajarubendra, Carlos Fay, Andre Berger, Mihir M. Desai, Inderbir S. Gill and Monish Aron

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## **Real-time indocyanine green angiography with the SPY fluorescence imaging platform decreases benign ureteroenteric strictures in urinary diversions performed during radical cystectomy**

Jim K. Shen , Juzar Jamnagerwalla , Bertram E. Yuh, Mitchell R. Bassett, Avinash Chenam, Jonathan N. Warner, Ali Zhumkhawala, Jonathan L. Yamzon, Christopher Whelan, Nora H. Ruel, Clayton S. Lau and Kevin G. Chan



## Results



No side effects  
from ICG



Minimal increase  
in operative time



Lower rate of  
UAS



## Limitations



Single center  
Retrospective



Needs validation  
with larger  
studies



Similar results to  
recent  
publications



## Conclusion



Fluorescence  
imaging with IV  
ICG



Decreased rate  
of UAS



Randomized,  
larger cohort  
needed



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- Shen JK, Jamnagerwalla J, Yuh BE, Bassett MR, Chenam A, Warner JN, et al. Real-time indocyanine green angiography with the SPY fluorescence imaging platform decreases benign ureteroenteric strictures in urinary diversions performed during radical cystectomy. *Ther Adv Urol*. 2019;11: 1756287219839631.