



Peritoneal Carcinomatosis and the Small Bowel: What the Radiologist sees - what the Surgeon finds.



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Learning objectives

- To compare the imaging findings of the small bowel (SB) on CT-Enteroclysis (CTE) with findings at surgery in patients with peritoneal carcinomatosis (PC). To review the CTE findings that could be used as criteria for inoperability, in candidates for cytoreductive surgery (CRS).
- CT is the method of choice in evaluating Peritoneal Carcinomatosis, but is non-sensitive and non specific in evaluating SB pathology.

Accuracy and Clinical Relevance of Computed Tomography Scan Interpretation of Peritoneal Cancer Index in Colorectal Cancer Peritoneal Carcinomatosis: A Multi-Institutional Study

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TABLE I. Accuracy of CT-PCI and Intraoperative PCI at Exploratory Laparotomy (ExLap) With Demonstration of Number of Accurate, Over-Estimate, and Under-Estimate Cases

Region #	Region	Presence of disease at ExLap (n, %), n = 52	Accuracy of assessing lesion sizes using CT scans and intraoperative ExLap			Kappa	P-value	Sensitivity (%)	Specificity (%)
			CT = ExLap (n, %)	CT > ExLap (n, %)	CT < ExLap (n, %)				
0	Central	34 (65%)	39 (75%)	2 (4%)	11 (21%)	0.65	<0.0005	76	90
1	RUQ	30 (58%)	37 (71%)	1 (2%)	14 (27%)	0.55	<0.0005	73	96
2	Epigastrium	25 (48%)	43 (83%)	8 (15%)	1 (2%)	0.70	<0.0005	98	77
3	LUQ	22 (42%)	42 (81%)	3 (6%)	7 (13%)	0.67	<0.0005	86	91
4	L Flank	28 (54%)	36 (69%)	3 (6%)	13 (25%)	0.51	<0.0005	73	89
5	LLQ	35 (67%)	32 (62%)	1 (2%)	19 (37%)	0.46	<0.0005	63	47
6	Pelvis	39 (75%)	35 (67%)	4 (8%)	13 (25%)	0.55	<0.0005	73	76
7	RLQ	37 (71%)	30 (58%)	4 (8%)	18 (35%)	0.42	<0.0005	63	79
8	R Flank	29 (56%)	34 (65%)	3 (6%)	15 (29%)	0.44	<0.0005	69	88
9	Proximal jejunum	22 (42%)	35 (67%)	4 (8%)	13 (25%)	0.34	0.0025	73	88
10	Distal jejunum	28 (54%)	30 (58%)	5 (10%)	17 (33%)	0.30	0.001	64	83
11	Proximal ileum	27 (52%)	34 (65%)	4 (8%)	14 (27%)	0.41	<0.0005	71	86
12	Distal ileum	36 (69%)	29 (56%)	3 (6%)	20 (38%)	0.37	<0.0005	59	84

Peritoneal Carcinomatosis From Colorectal or Appendiceal Origin: Correlation of Preoperative CT With Intraoperative Findings and Evaluation of Interobserver Agreement

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TABLE V. Agreement Between Both Radiologists per Site Regarding Presence or Absence of Tumor Involvement

Abdominopelvic area	Agreement radiologists	Measure of agreement* (κ)
Pelvis	84% (21/25)	0.662 $\pm$ 0.146
Ileocaecal area	84% (21/25)	0.432 $\pm$ 0.214
Omentum/transversal colon	92% (23/25)	0.781 $\pm$ 0.148
Mesentery/small bowel	64% (16/25)	0.295 $\pm$ 0.158**
Subhepatic area	88% (22/25)	0.336 $\pm$ 0.294
Subdiaphragmatic left	88% (22/25)	0.603 $\pm$ 0.603
Subdiaphragmatic right	96% (24/25)	0.648 $\pm$ 0.648
Overall	85% (149/175)	0.560 $\pm$ 0.075***

Note, agreement on tumor size per site is 142/175 ($\kappa = 0.484 \pm 0.069$, $P = 0.014$).

*Measure of agreement by Kappa index. With McNemar's chi-square test (binomial distribution used) no significant disagreement except for ** $P = 0.039$ and *** $P = 0.002$.

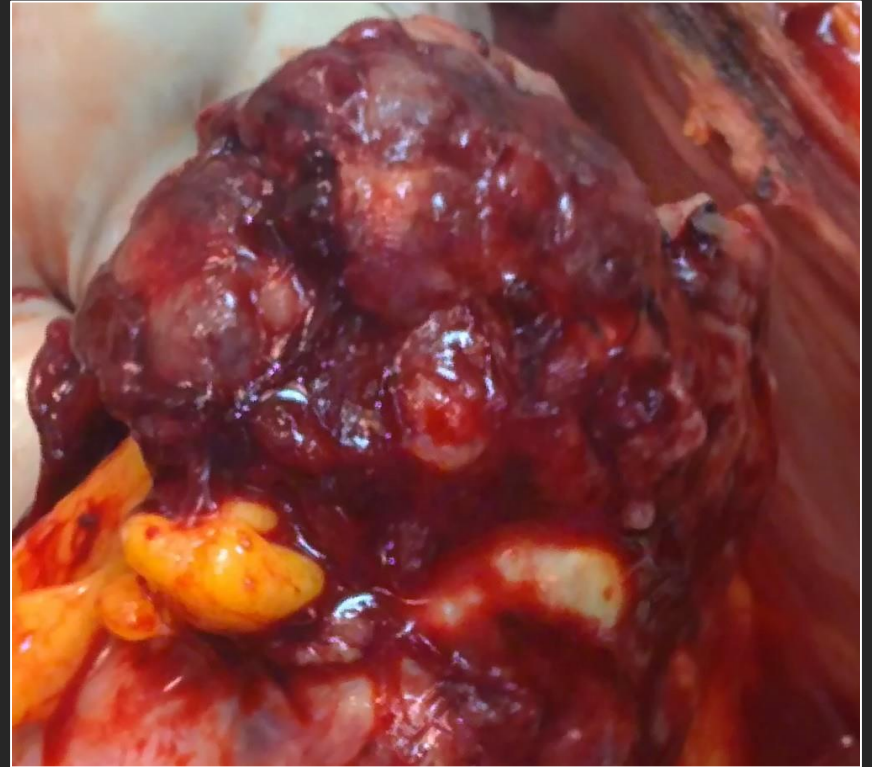
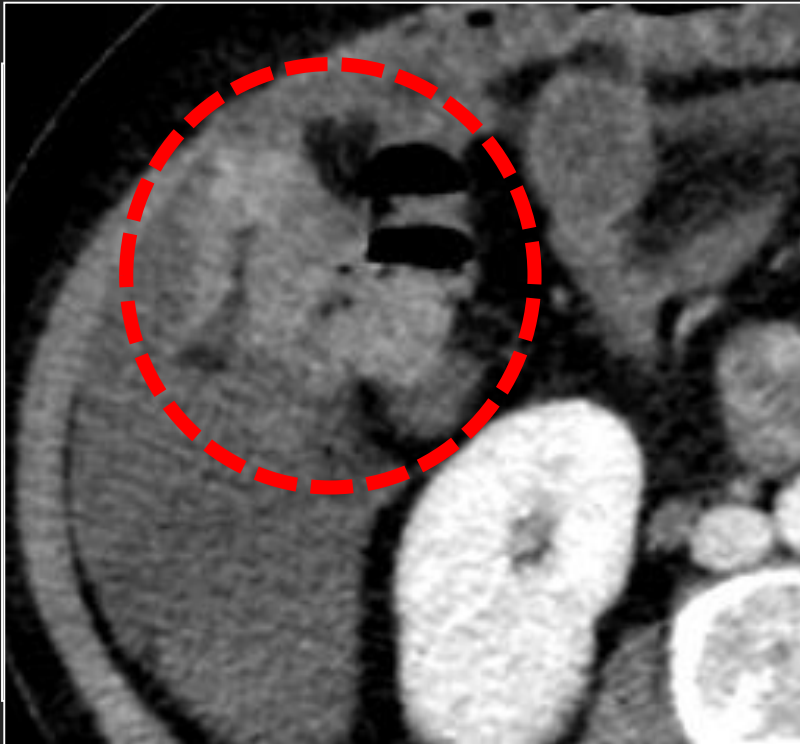
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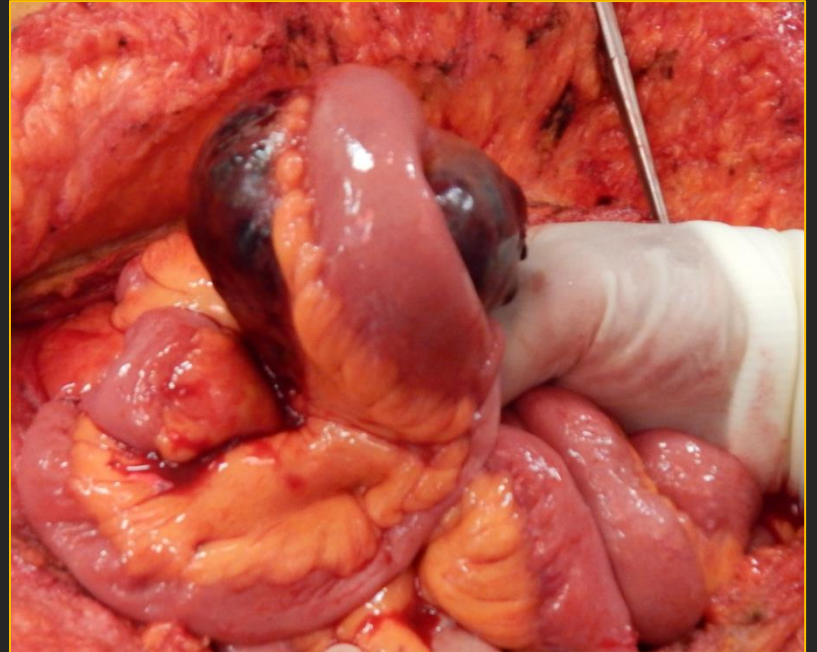
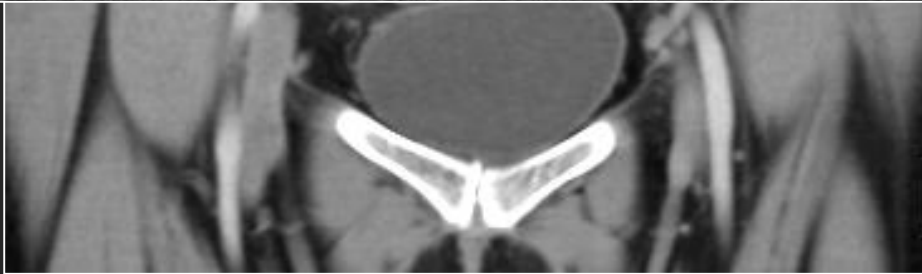
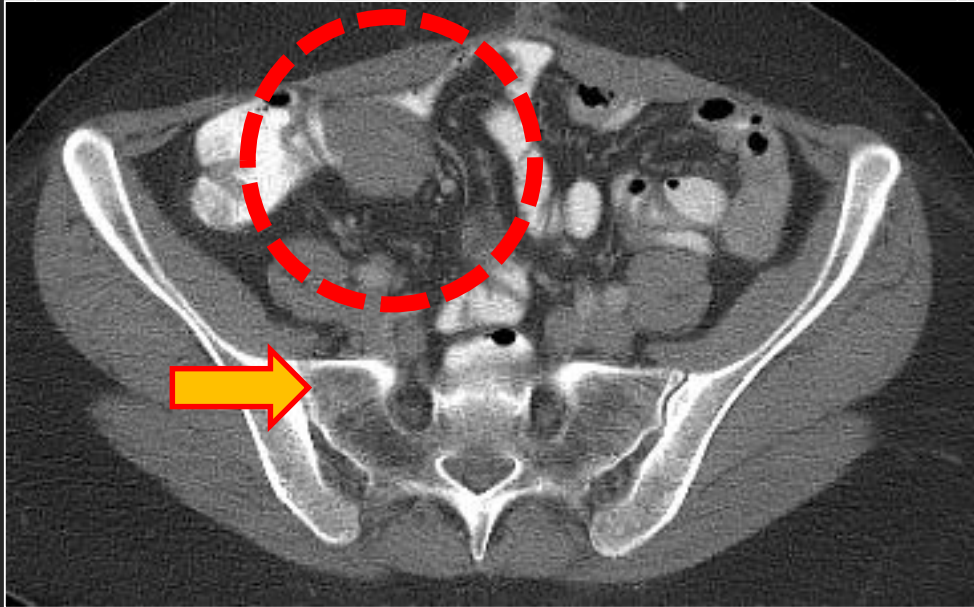
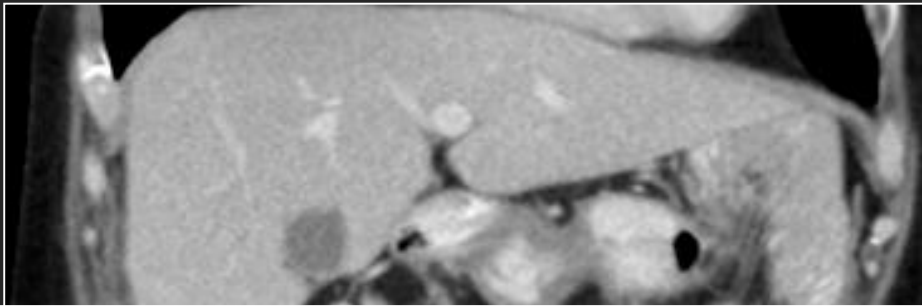
- The study enrolled CTEs of 131 consecutive patients with PC from different primaries (ovaries, colon, peritoneal mesothelioma, stomach, pseudomyxoma peritonei). All CTEs have preoperatively been evaluated by two radiologists certified in abdominal imaging. Patients were operated by the same surgical team. Imaging findings were compared with findings at laparoscopy or CRS.

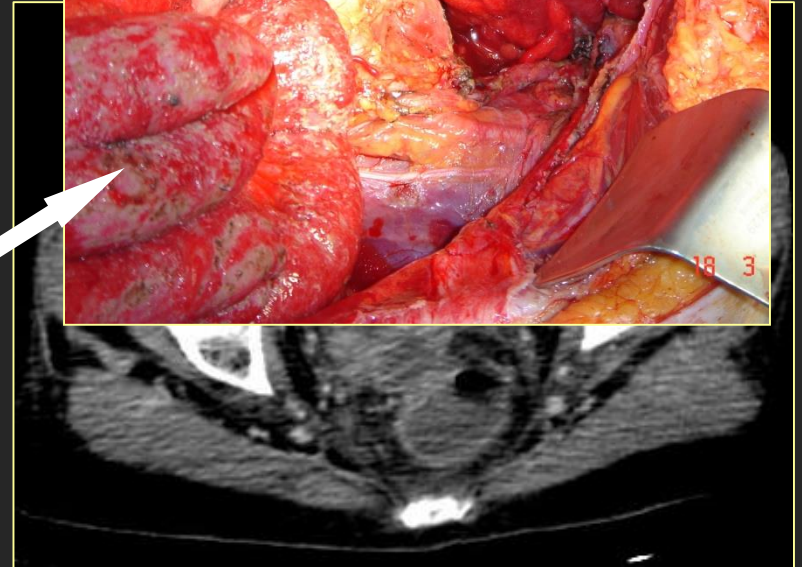
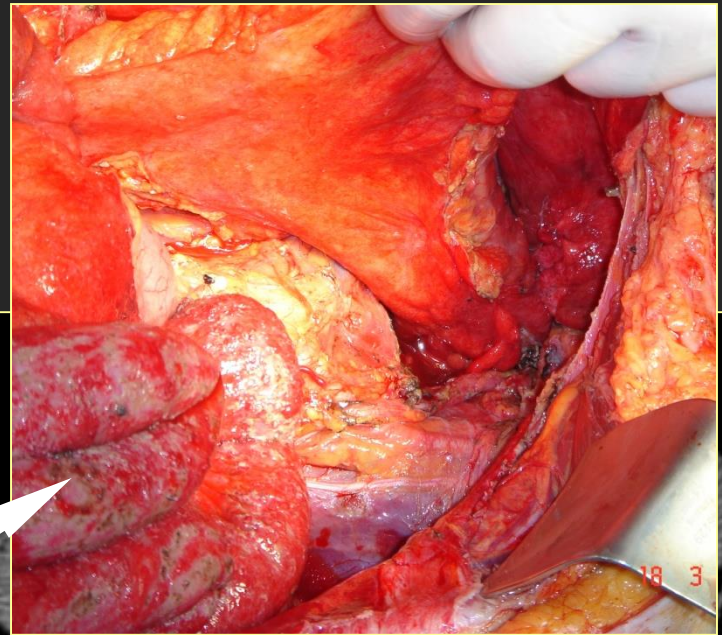
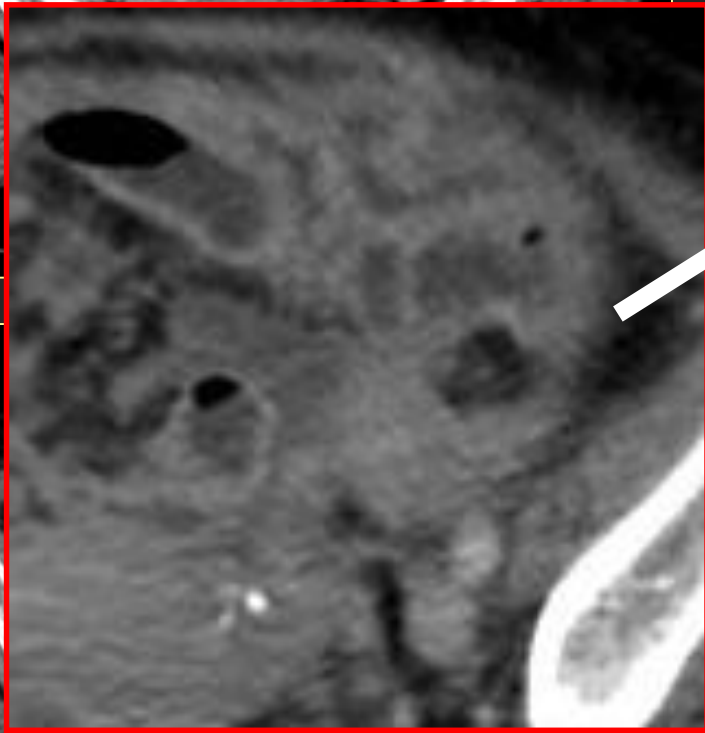
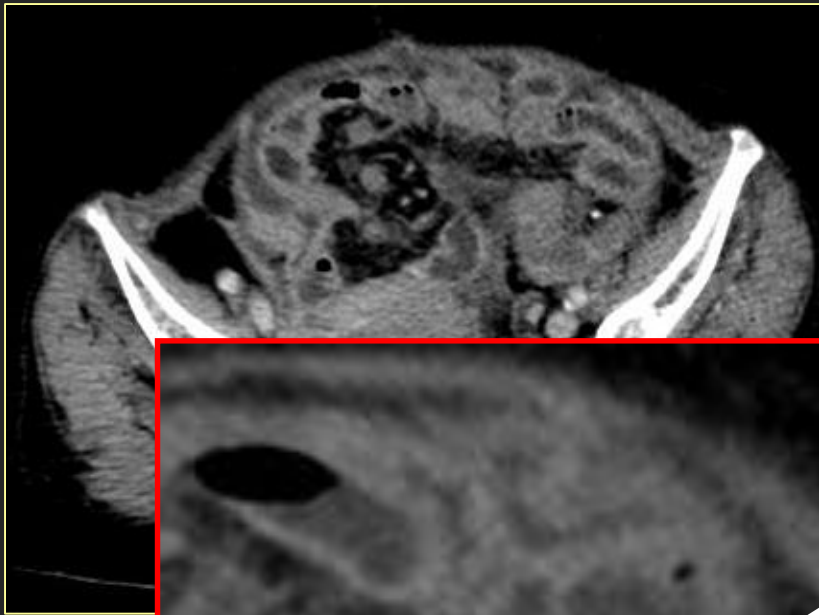
Imaging Findings

- The Peritoneal Carcinomatosis Index (PCI) on CTE (PCI-CTE) correlated well with the surgical PCI. The spectrum of the imaging findings included nodules, nodes, masses, plaques in the intestinal wall, stranding and pleated mesentery. The type of PC and the morphology of implants were depended on the primary tumor. The “layered-type” irregular thickening of SB wall was associated with decreased ability of SB lumen to distend or presence of stenosis. SB mesentery involvement could be manifested by distortion, thickening, and fixation of mesenteric folds (“frozen mesentery”). The aforementioned CTE findings, when present, preclude complete CRS and could be introduced as additional exclusive criteria in the selection process.

Omental cake involving SB loops



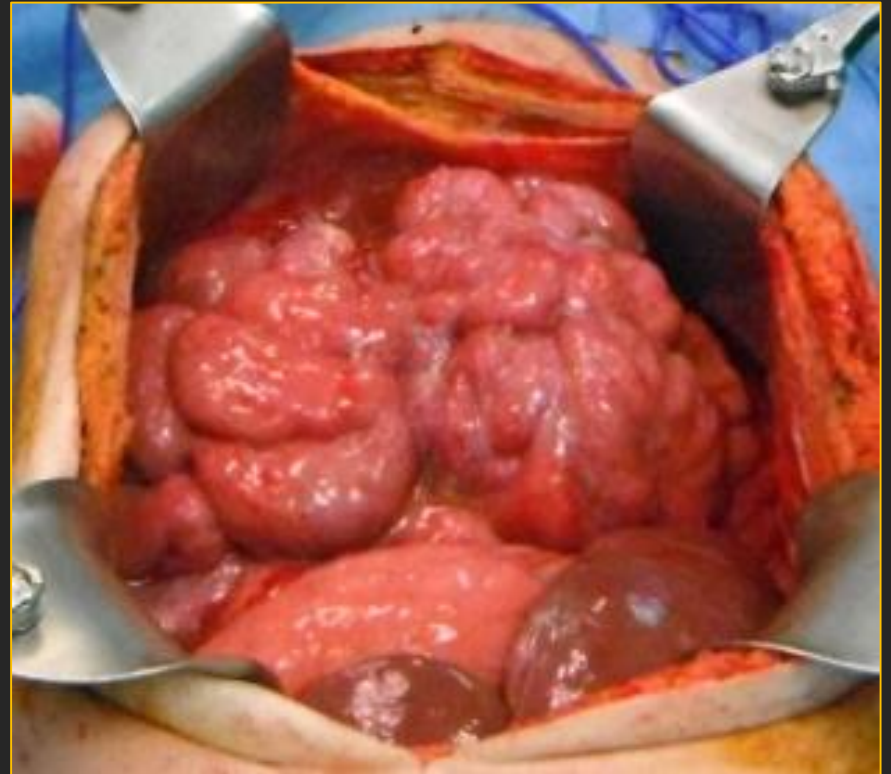
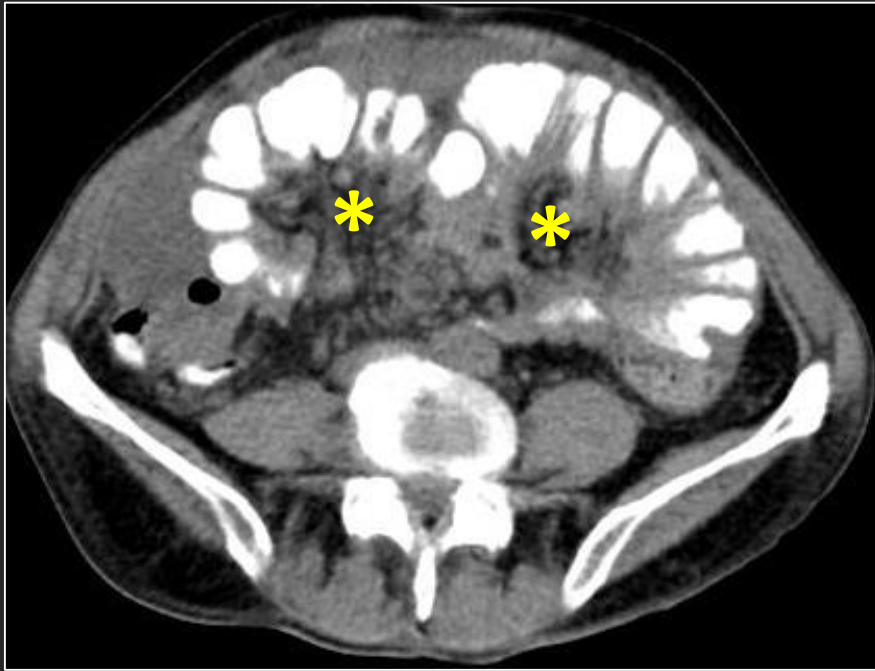


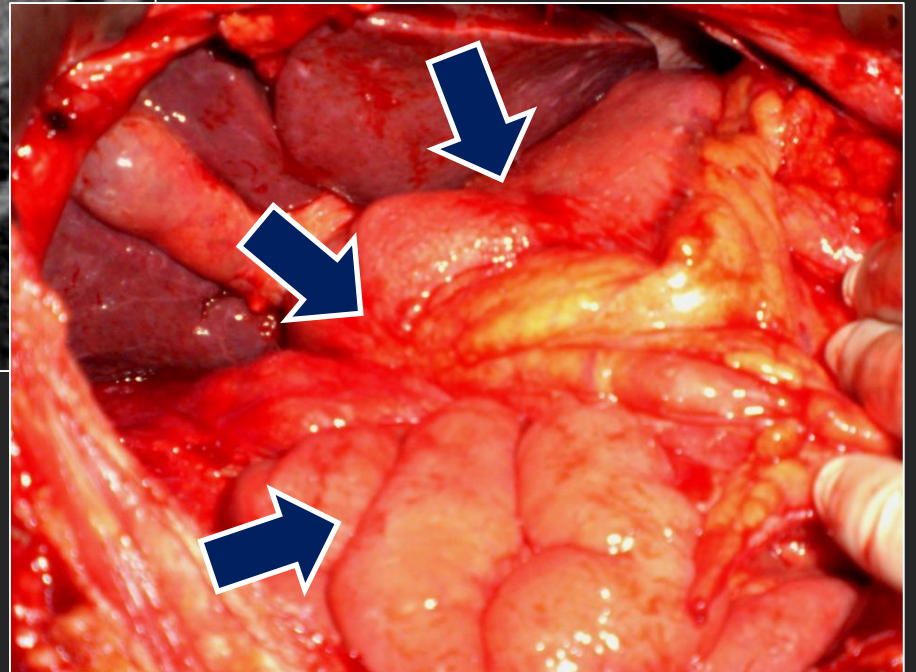
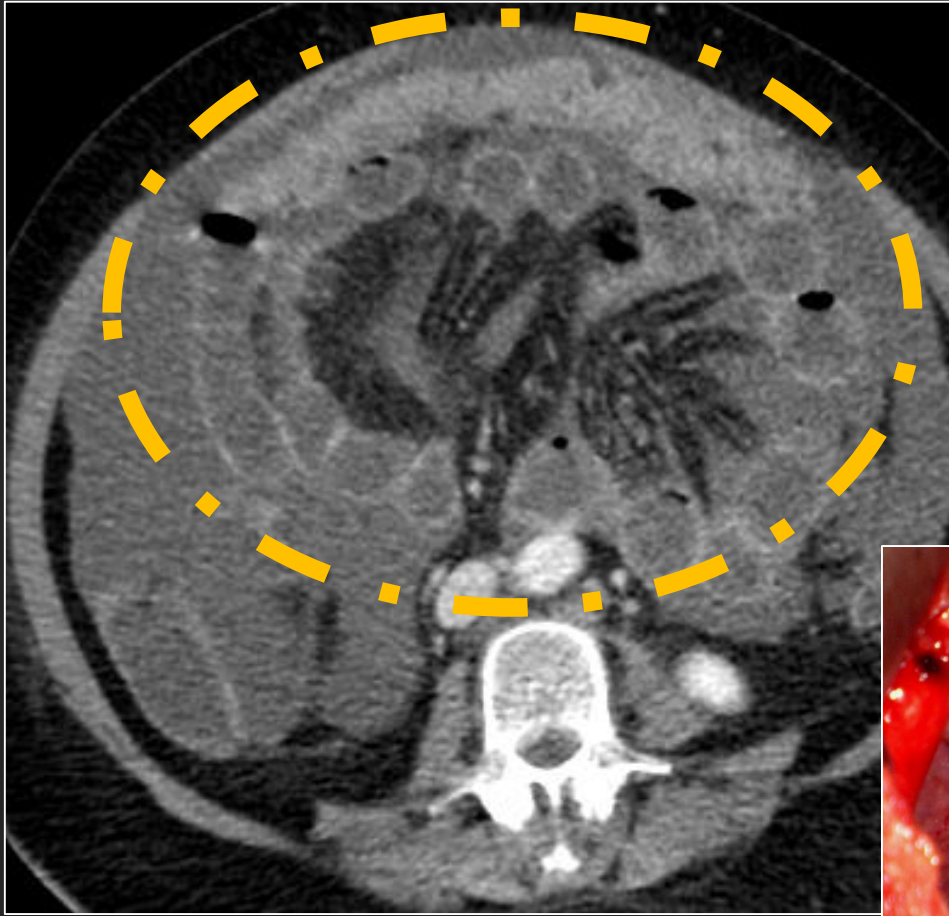


“layered type” of
involvement of the SB

Inoperable case

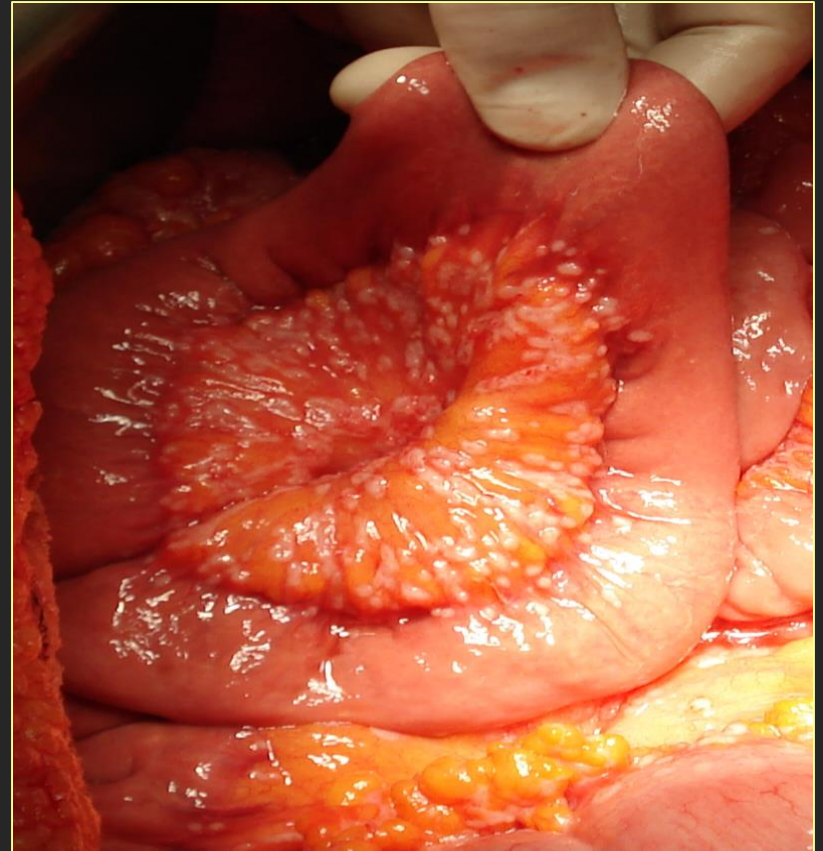
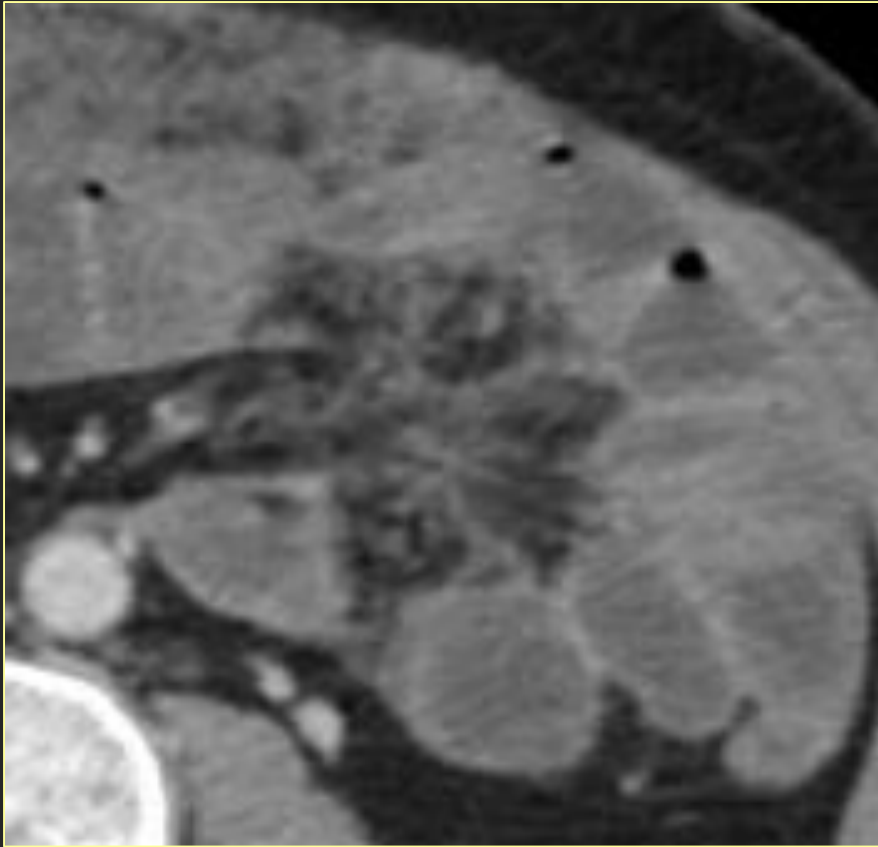
“frozen mesentery” – inoperable case

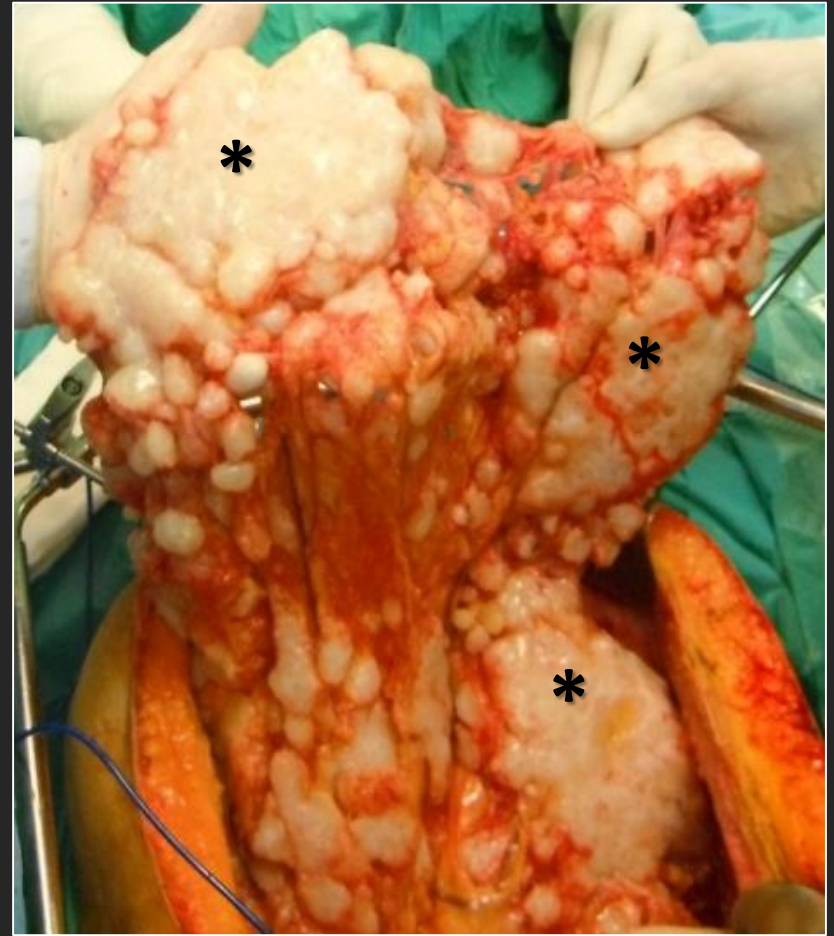
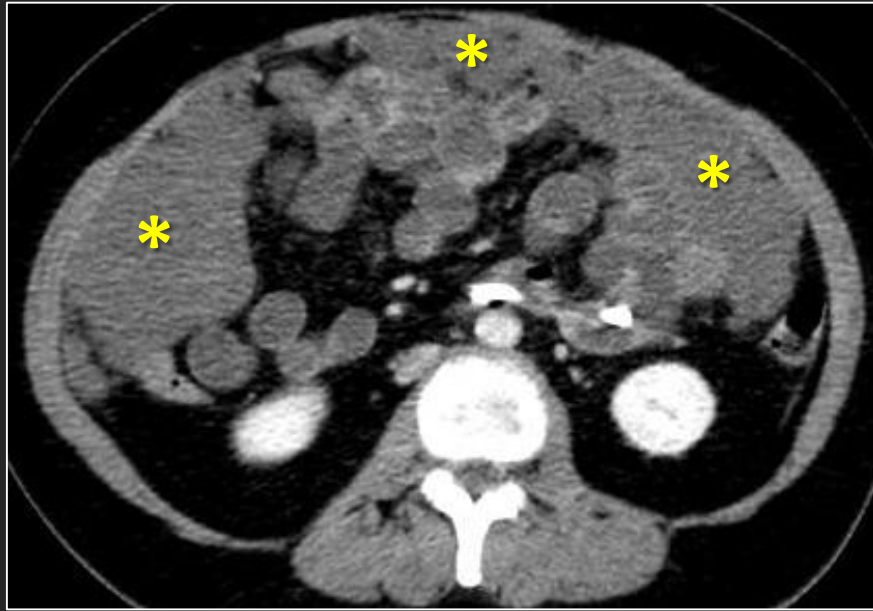




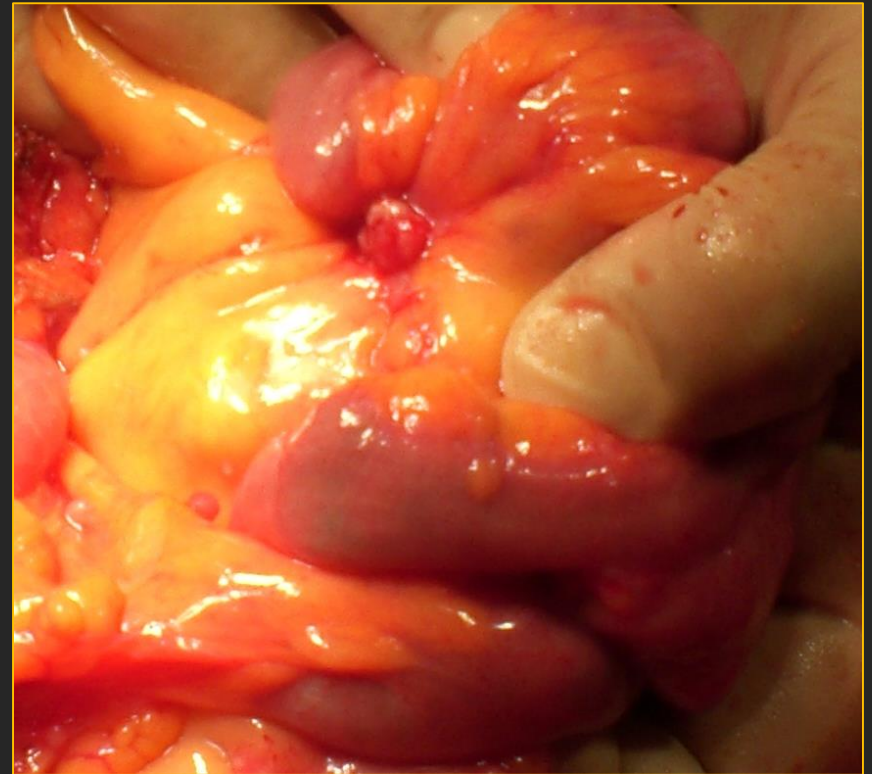
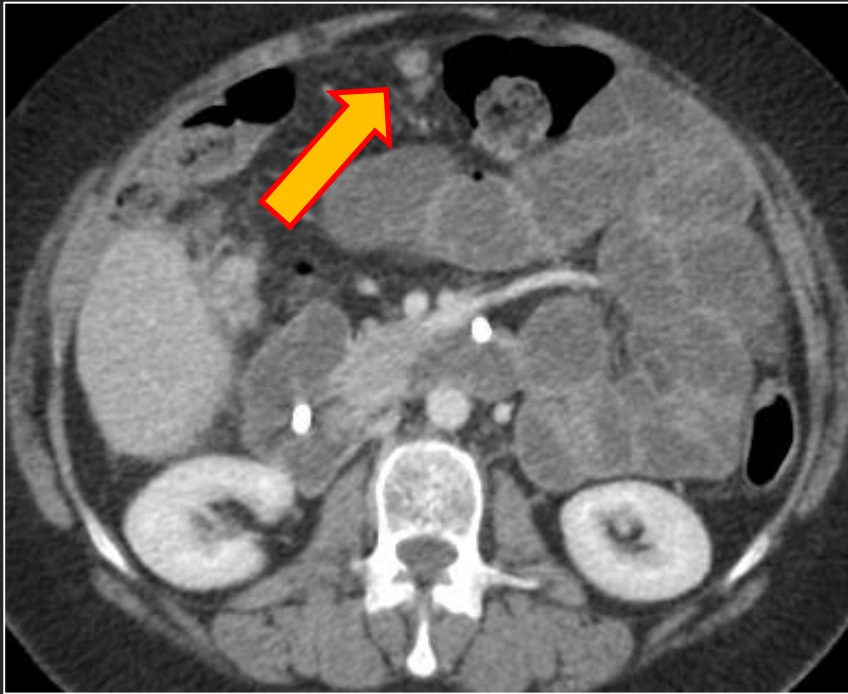
**“frozen mesentery” –
inoperable case**

cancerous implants in the mesentery

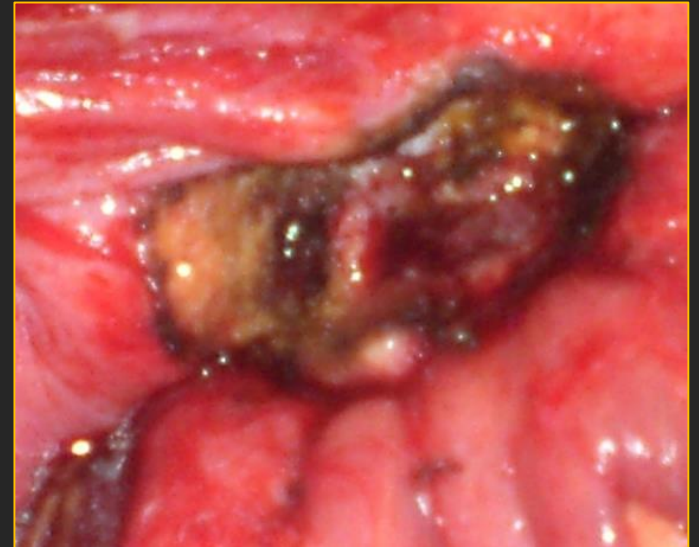
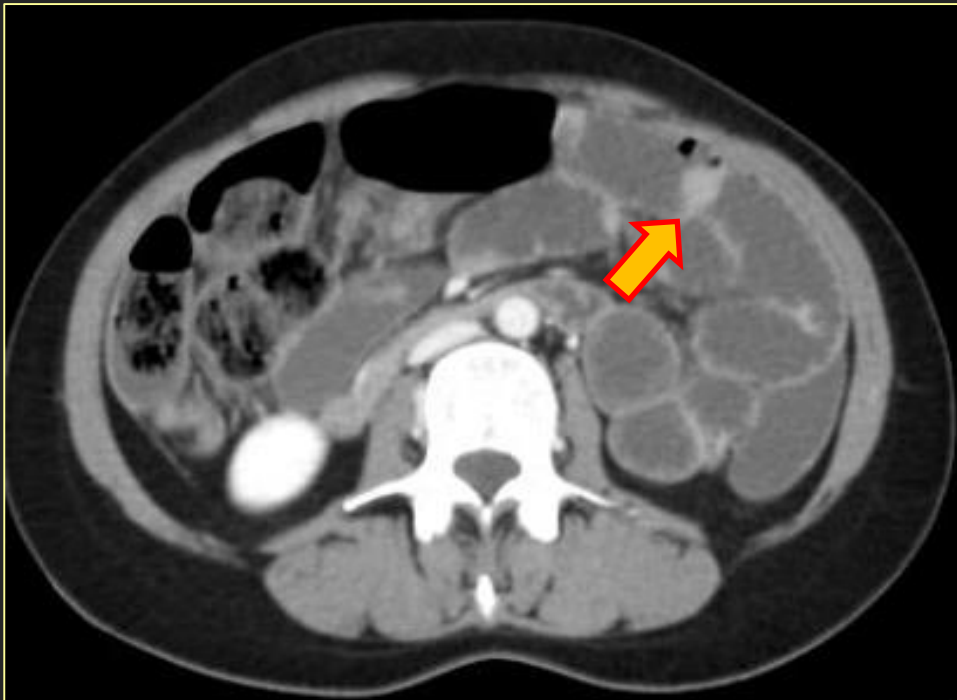




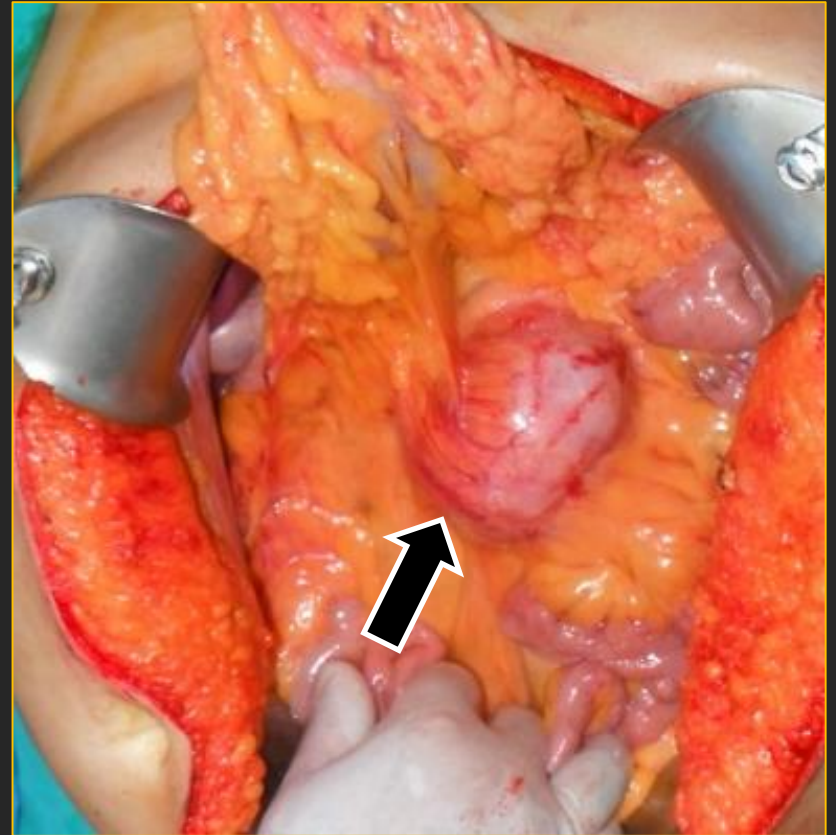
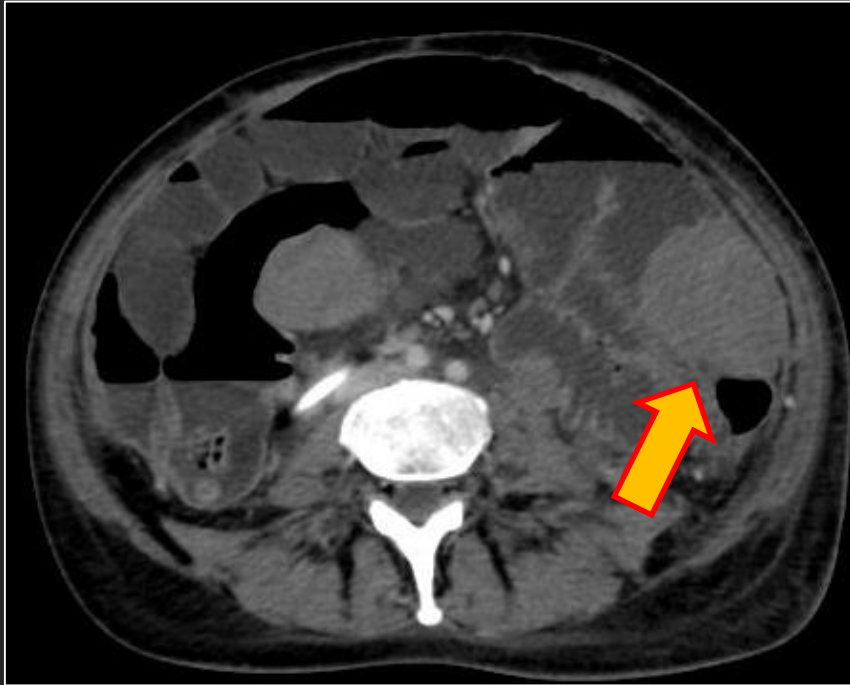
cancerous implants in the mesentery



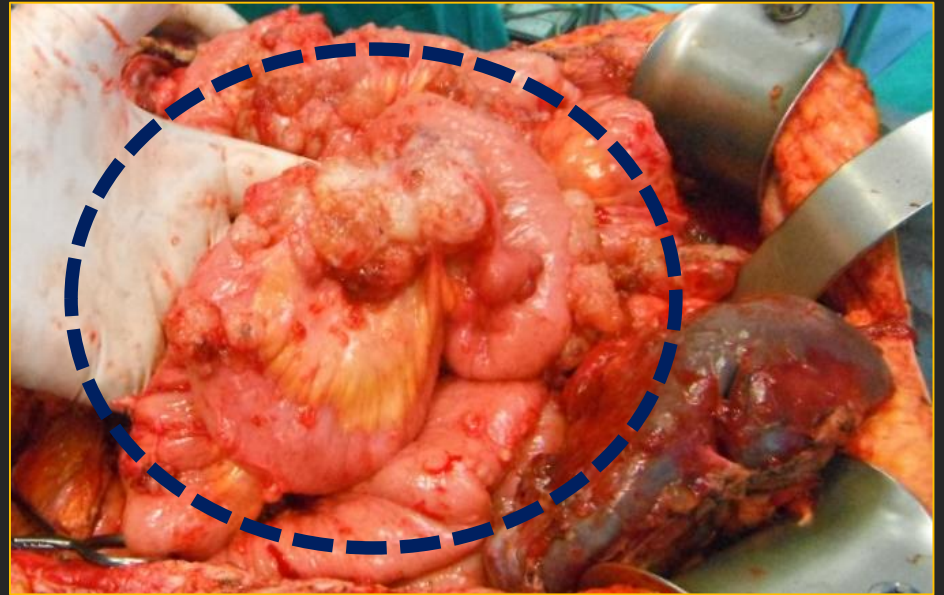
cancerous implants between
bowel loops



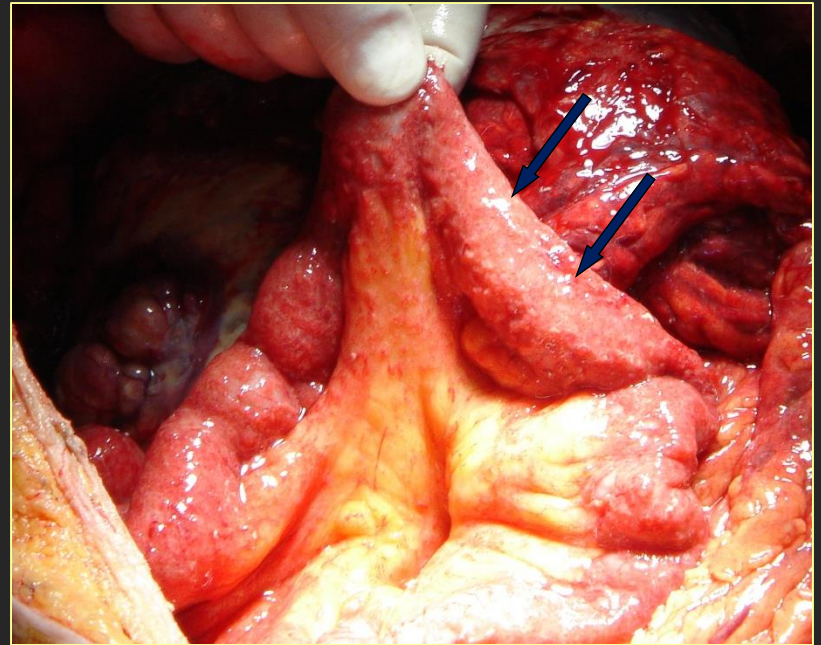
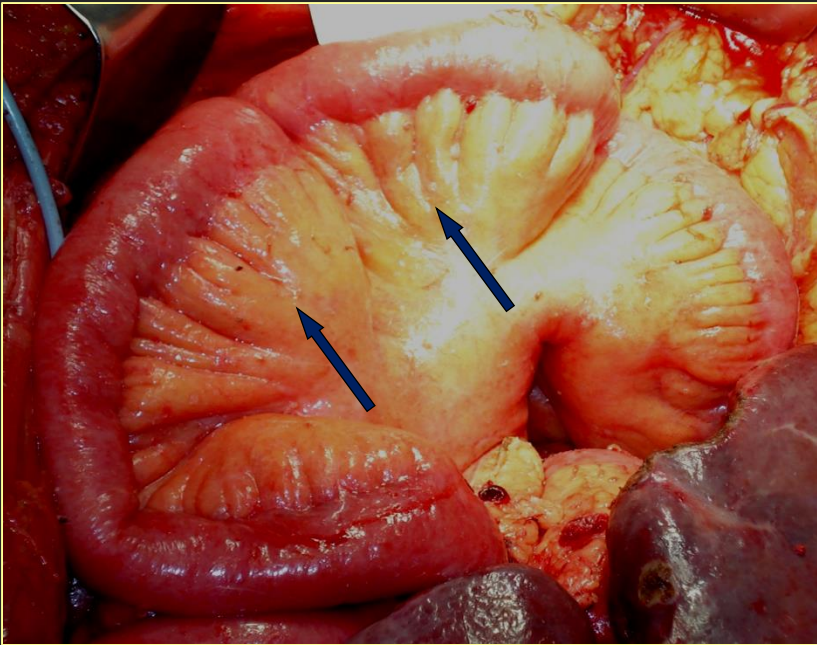
cancerous implants between bowel loops



cancerous implants between bowel loops



Non detectable lesions on CTE



Conclusion

- *Preoperative CTE demonstrates the extent and distribution of PC in the SB/mesentery, exhibiting correlation with surgical grading.*
CTE might be indicated in the selection process of candidates for optimal CRS and may also provide criteria of inoperability.



Thank you!