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Natural History of Radiologic Incisional Hernia Following Robotic Nephrectomy (PD11-07)

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Disclosures



- I have no conflict of interest in relation to this presentation.



Introduction



- Increased utilization of minimally invasive surgeries has led to the emergence of new types of complications including **incisional hernia (IH)**.
- IH may be occult or symptomatic; presenting with pain, bulge, bowel incarceration, strangulation and increased morbidity and mortality.
- **Few studies are available in urologic literature regarding IH**, specially its natural history, that is mainly based on small sample-sized and poorly defined follow-ups.



Objectives



- The aim of this study is to evaluate the incidence, characteristics, and natural history of radiologic IH in patients who underwent robotic partial or radical nephrectomy for kidney tumor.



Methods



Patients:

This is a retrospective study using our IRB-approved renal mass database

- **Inclusion criteria**

Patients who underwent robotic-assisted partial or radical nephrectomy for renal cancer between January 2011 and April 2017 (375 cases).

- **Exclusion criteria**

1. Patients without available 6-month pre-op high-quality abdominopelvic CT scan (58 cases)
2. History of abdominal surgery with mesh repair (7 cases),
3. Open abdominal operation within 1-year following surgery (2 cases)
4. Patients without available images/lost to follow-up (61 cases)

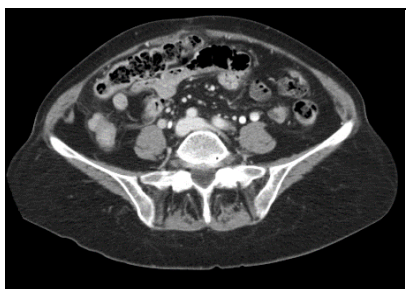


Surgical procedure:

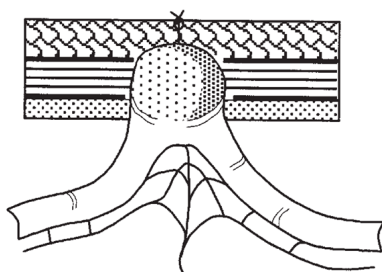
- The nephrectomies were done using Da Vinci Si or Xi surgical system.
- Five to seven trocars were generally used for each procedure, including three/four 8-mm robotic trocars and one to three 5-12-mm assistant trocars.
- The midline and lateral ports were established using longitudinal and horizontal incisions, respectively.
- The fascia was routinely closed on 12 mm ports using absorbable sutures with or without the Carter-Thomason device.
- The skin was closed on all ports with 4-0 absorbable suture in a subcuticular manner.

Radiology review:

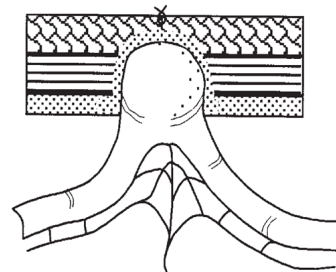
- Three independent experienced radiologists reviewed imagings for evaluation of IH and their features (i.e. size, location, and type) with a high reliability (Intra Class Correlation=0.94, 95% CI: 0.86, 0.97).
- Type of IH was classified based on Tonouchi classification*:



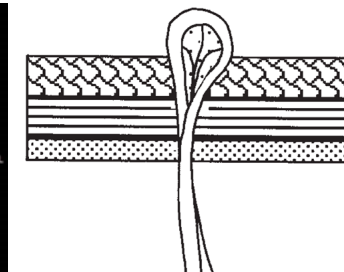
Early-onset fascial IH



Late-onset fascial IH



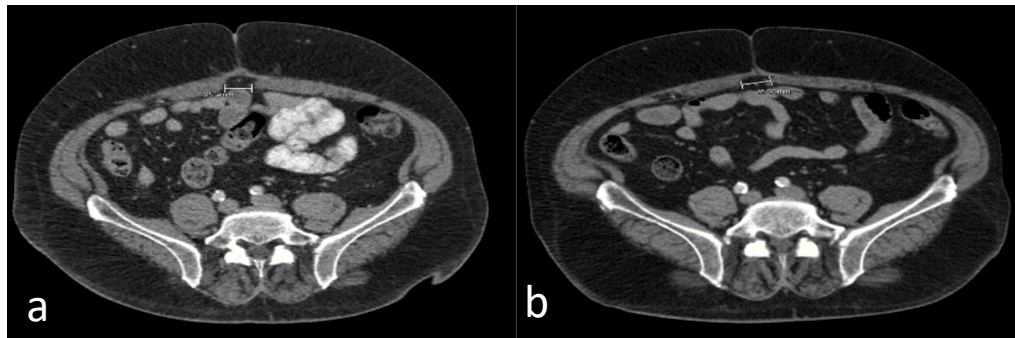
Bowel/fat containing IH



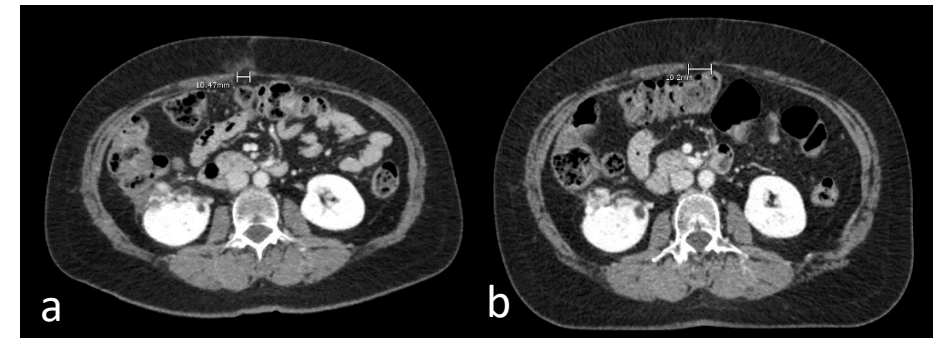
*Tonouchi H, Ohmori Y, Kobayashi M, et al. Trocar site hernia. Arch Surg 2004; 139:1248-56.

Imaging follow-ups:

- Patients who developed IH were followed closely and classified into stable or progressive:
 1. **Stable IH:** size change $< 10\%$ in follow-ups
 2. **Progressive IH:** size change $> 10\%$, upgrading per Tonouchi classification, or becoming symptomatic.



Stable IH:
No change in size/grade in 3 years



Progressive IH:
Size change from 10.4 (a) to 18.2 mm (b) in 2 years



Results



Baseline features:

- Total sample size: 247 patients

Variable	Value
Age (year)	
Mean±SD (range)	61.5±11.8 (23-95)
Sex, n (%)	
Male	176 (71.3)
Female	71 (28.7)
BMI (kg/m2)	
Mean±SD (range)	29.9 (12.4–95.8)
CCI, n (%)	
0	129 (52.2)
≥1	118 (47.8)
ASA, n (%)	
1-2	102 (41.3)
≥ 3	145 (58.7)
Underlying respiratory disease, n (%)	26 (10.5%)
Smoking, n (%)	84 (34%)
Prior abdominal surgery, n (%)	121 (49)
Open	101 (41)
Lap	30 (12.1)
Robotic	10 (4)
Type of procedure, n (%)	
Partial nephrectomy	169 (68.4)
Radical nephrectomy	78 (31.6)

Variable	Value
Approach, n (%)	
Trans-peritoneal	231 (93.5%)
Retroperitoneal	16 (6.5%).
Side, n (%)	
Right	131 (53)
Left	115 (46.6)
Bilateral	1 (0.4)
Operative time (min)	
Mean±SD (range)	260.7±80.1 (28-580)
Estimated blood loss (cc)	
Mean±SD (range)	222.9±265.9 (0-2500)
Pathologic stage, n (%)	
T1	184 (75.5)
T2	14 (5.7)
T3	48 (19.4)
T4	1 (0.4)
Histologic subtypes, n (%)	
Clear cell	200 (81)
Papillary	22 (8.9)
Chromophobe	14 (5.7)
Other	11 (4.4)
Adjuvant therapy, n (%)	12 (4.9%)



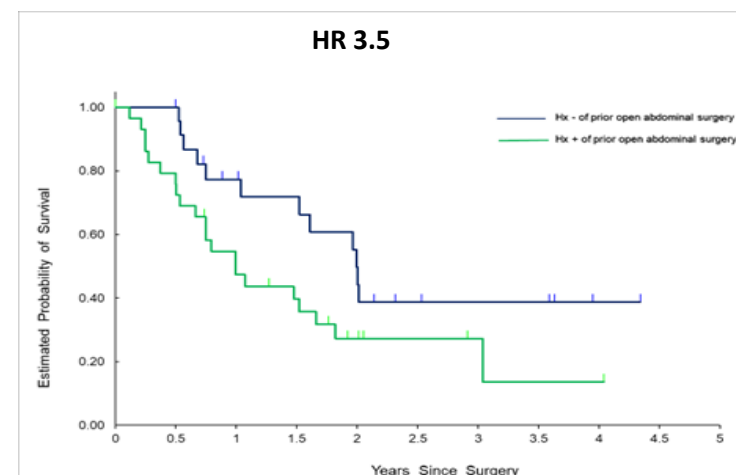
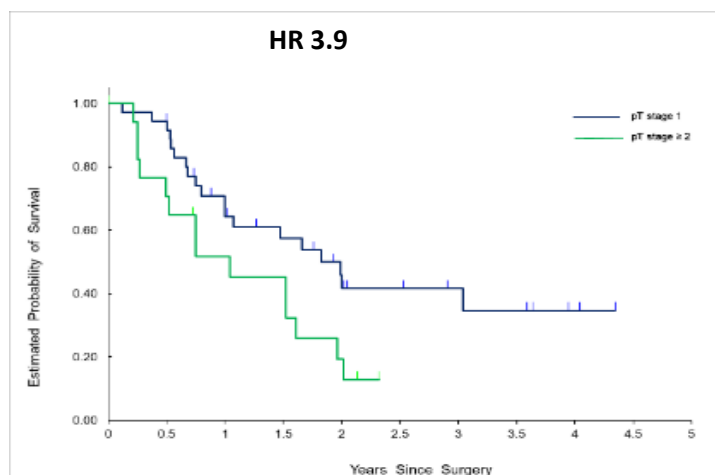
Radiologic IH development:

- **Median follow-up:** 2.6 (range 1-6.7) years
- **Incidence of radiologic IH:** 27.5% (68 patients)
 - No difference between partial and radical nephrectomy cases (26.6% and 29.5%, p -value 0.43)
 - No difference between intraperitoneal and retroperitoneal approaches (HR=1.67, p -value 0.43)
- **IH grades:**
 - early-onset (35.3%)
 - late-onset (51.5%)
 - Bowel/fat containing type (13.2%)
- **IH locations:**
 - midline (58.8%),
 - anterolateral (36.8%)
 - posterior (4.4.%)
- **Median time to radiologic IH:** 1.7 years (IQR 0.84-2.52).
- **Multivariable Cox regression analysis:** adjuvant therapy was an independent predictor for radiologic IH development (HR 3.23, 95% CI 1.44-7.27 and p -value 0.004).

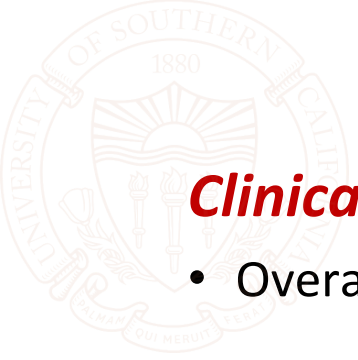


Natural history of radiologic IH:

- During the follow up of 68 patients who developed IH, 33 (48.5%) had progression.
- **Median time to progression** was 1.5 years
- **In multivariable analysis** two factors were significantly associated with hernia progression:
 1. **T stage ≥ 2** (HR 3.93, 95% CI 1.74-8.89)
 2. **History of open abdominal surgery** (HR 3.47, 95% CI 1.53-7.93)



Kaplan-Meier curve estimation of IH progression stratified by history of pT stage (left) and open abdominal surgery (right)



Clinical IH:

- Overall **incidence of clinical IH** in our cohort was **3.2%** (8 cases).
- All had a history of **prior abdominal surgery** of which 75% were open.
- The median BMI was 34.4 kg/m².
- All the surgeries were done with **trans-peritoneal approach**.
- Among 8 clinical IH, 7 (87.5%) were **bowel/fat-containing**.
- Median clinical IH size was 47.5 mm.
- **Median time from surgery to clinical IH development was 2.5 years.**



Strengths

1. Large homogenous sample size
2. Standardized surgery by highly skilled minimally invasive urologists in an academic center
3. Meticulous radiology review by an expert radiology team
4. Long term follow-up



Limitations

1. Retrospective nature
2. Single institution
3. Inability to separate different trocar site than extraction site hernia if no separate incision was made

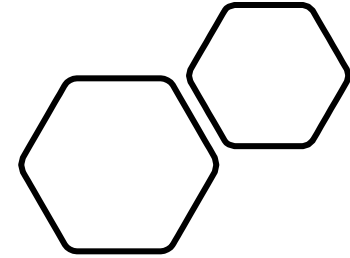


Conclusion



- Radiologic incisional hernia is not uncommon following robotic nephrectomy occurring in 27.5% of cases.
- In a median follow-up of 1.5-year, progression rate is as high as 50%, though overall 3.2% become symptomatic.
- Adjuvant cancer therapy was an independent predictor for IH development.
- Higher stage and history of prior open abdominal surgery were associated with IH progression.

THANKS FOR YOUR ATTENTION



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