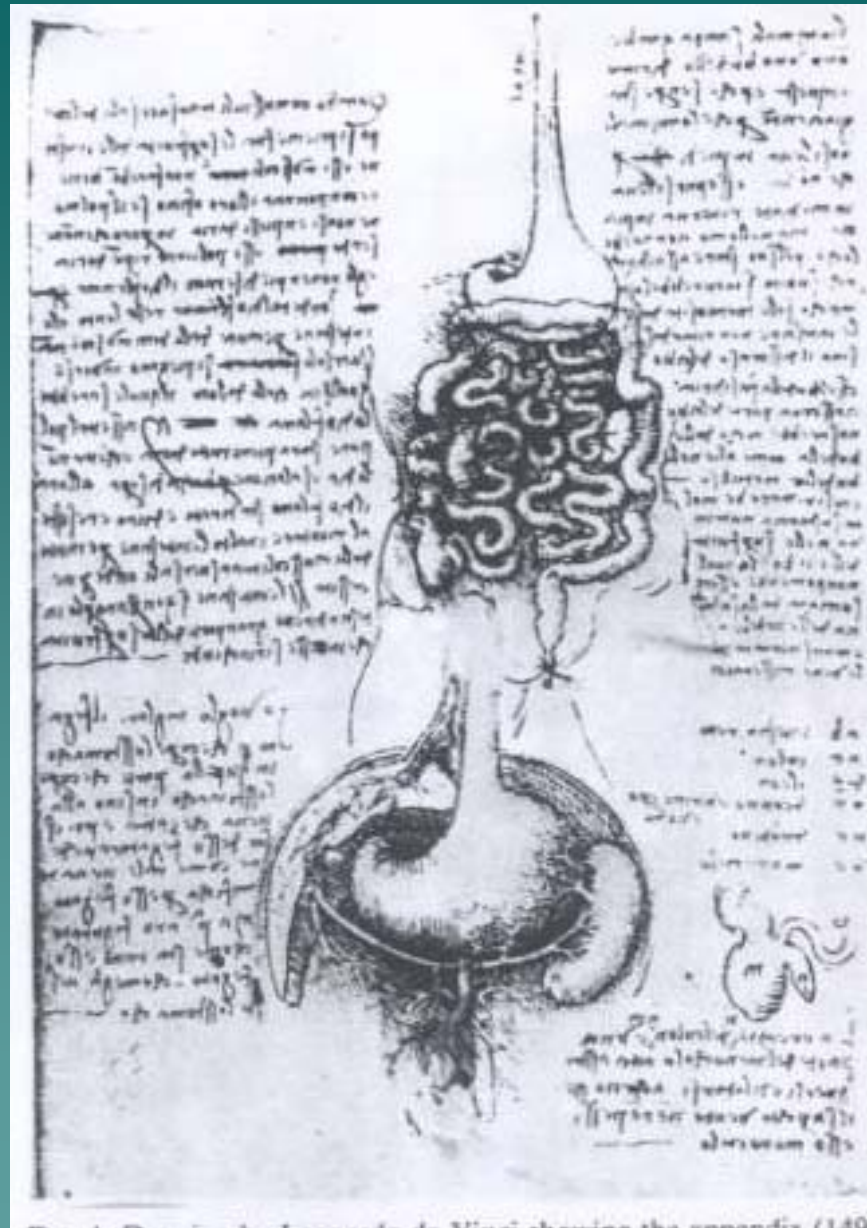


# 腹腔鏡闌尾切除手術



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Leonardo da Vinci

1492

# Clinical diagnosis

- ◆ *Any pain in the right lower quadrant suggests the diagnosis of acute appendicitis*
- ◆ *Classic visceral-somatic pain sequence (55%) + anorexia , nausea*
- ◆ *Undoubted peritoneal irritation*

# Laboratory Test

- ◆ 1/3 of patients have pyuria or hematuria
- ◆ sensitivity and specificity of CRP : 0.70 and 0.62 (depending on cut-off value)
- ◆ The diagnostic accuracy of leukocyte count was significantly better than CRP
- ◆ 30 % of patients have a normal WBC count.

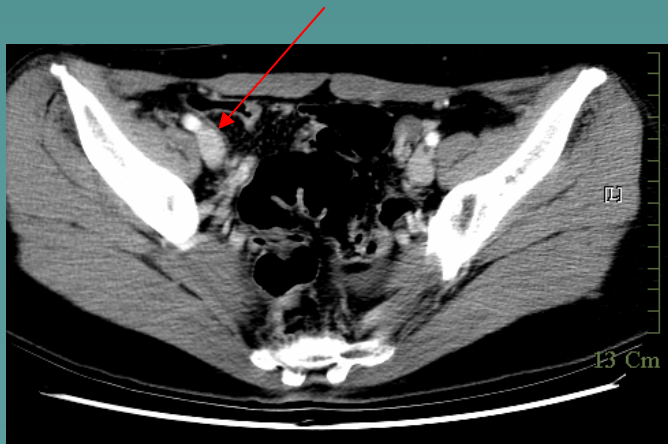
# Difficulties in Diagnosis

- ◆ Patients with diarrhea
- ◆ Appendix in pelvic position
- ◆ Obese patients
- ◆ Young children: atypical pain, delay in diagnosis
- ◆ Elderly persons: perforation, comorbidity
- ◆ Pregnant women: confusing symptom/sign, anatomy

# Is Computed Tomography Better Than Ultrasound?

	sensitivity	specificity
CT	0.94 (0.91 ~ 0.95)	0.95 (0.93 ~ 0.96)
Sono	0.86 (0.83 ~ 0.88)	0.81 (0.78 ~ 0.84)

- ◆ CT is used in patients who are obese; have a rigid, non-compressible abdomen; or are thought to have abscess



Ann Intern Med. 2004

# Diagnostic Effect of Laparoscopy

- ◆ Reduction of negative appendectomy (RR:0.21)
- ◆ Infertile women, the reduction of negative appendectomy were more pronounced (RR:0.19)

Sauland S et al. Cochrane Database of  
Systematic Reviews. 1, 2003



# Cecal Diverticulitis

- Very rare in the western population
- Significantly more prevalent in Asian population
- Presents at a younger age
- Has a more benign clinical course



# Prevalence in Asians

- Right-sided at 5-19% vs Left-sided at 2-6 %
- Right-sided diverticula:
  - 2/3 multiple
  - 1/3 solitary cecal diverticulum
- The frequency of right-sided diverticula:
  - 44% in Taiwan
  - 70% in Singapore, Thailand, and Hong Kong

# Ratio of Right-Sided Diverticulitis to Appendicitis

- Luoma and Nagy reported 1:220 (Can J Surg 1989;32:282-6)
- Lo and Chu reported 1:180 (Am J Surg 1996;171:244-6)
- Lim reported 8 : 336 appendectomies  
(Lim KG, Med J Malaysia Jun 1999)

# Symptoms and Signs

- Possible discriminates from acute appendicitis:
  - Symptoms prior to presentation are longer
  - Lower incidence of nausea, vomiting, and anorexia
  - Right lower quadrant pain

# Symptoms and

# No. of Patient (%)

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Symptoms and Signs	No. of Patient (%)
Right lower quadrant pain	86 (96)
Abdominal tenderness	87 (97)
Fever	38 (42)
Anorexia	31 (34)
Nausea and vomiting	21 (23)
Prior episode of pain	18 (20)
Diarrhea	13 (14)
Palpable mass	10 (11)
Positive guaiac	9 (10)

(Harada and Whelan, 1993, Am J Surg 166:666-669)

# Intraoperative Diagnosis

- 50-89% accurate
- Ballantyne et al reviewed 367 cases
  - intraoperative diagnosis was in 58% of patients
  - 40% of intraoperative diagnosis is believed to be a neoplasm (DCR 30:821-826, 1987)

The limited incision may have altered the accuracy of diagnosis

# 闌尾炎

- ◆ 每年闌尾炎住院病人數約**23,000**人，平均年齡約**32**歲，以男性居多約占**54%**

# 闌尾炎流行病學分析(一)

性別發生率 (/每1000人)

年份	女性	男性	全部
2001年	1.10	1.29	<b>1.20</b>
2002年	1.05	1.27	<b>1.16</b>
2003年	1.00	1.00	<b>1.05</b>
<b>美國2001</b>	<b>1.00</b>	<b>1.21</b>	<b>1.10</b>

資料來源：

- 一、Department of Health and Human Services, 2001 National Hospital Discharge Survey
- 二、中央健康保險局90-92年住院醫療費用資料



# 闌尾炎流行病學分析(二)

## ◆ 年齡別發生率 ( /每1000人)

年份	年 齡				合計
	15以下	15-44	45-64	65以上	
2001年	0.61	1.49	1.10	1.22	<b>1.20</b>
2002年	0.64	1.43	1.04	1.12	<b>1.16</b>
2003年	0.65	1.29	0.89	0.95	<b>1.05</b>

資料來源：

- 一、Department of Health and Human Services, 2001 National Hospital Discharge Survey
- 二、中央健康保險局90-92年住院醫療費用資料

# 闌尾切除術利用率分析

## 一年齡別

年齡	2001年			2002年			2003年			美國 平均 天數
	平均 天數	ICU 比率	人次	平均 天數	ICU 比率	人次	平均 天數	ICU 比率	人次	
15以下	5.24	3.0%	2,739	5.16	3.0%	2,828	5.31	4.2%	2,810	3.0
15-44	4.22	0.5%	16,123	4.29	0.5%	15,595	4.27	0.7%	14,035	2.6
45-64	5.71	1.5%	4,811	5.69	2.7%	4,701	5.84	2.9%	4,225	3.6
65以上	8.53	13.1%	2,387	8.56	16.6%	2,255	8.79	19.0%	1,963	6.7
合計	5.00	2.1%	26,060	5.03	2.6%	25,379	5.07	3.1%	23,033	3.1

資料來源：

- 一、Department of Health and Human Services, 2001 National Hospital Discharge Survey
- 二、中央健康保險局90-92年住院醫療費用資料

# 闌尾切除術利用率分析

## — 醫院層級

特約類別	2001年			2002年			2003年		
	平均 天數	ICU 比率	人次	平均 天數	ICU 比率	人次	平均 天數	ICU 比率	人次
醫學中心	5.33	3.5%	7,606	5.32	5.3%	7,597	5.48	4.7%	6,686
區域醫院	5.01	2.0%	11,139	5.1	1.9%	11,309	5.07	3.1%	10,339
地區醫院	4.63	0.9%	7,315	4.54	1.0%	6,473	4.59	1.5%	6,008
<b>合計</b>	<b>5.00</b>	<b>2.1%</b>	<b>26,060</b>	<b>5.02</b>	<b>2.7%</b>	<b>25,379</b>	<b>5.06</b>	<b>3.1%</b>	<b>23,033</b>

資料來源：中央健康保險局90-92年住院醫療費用資料

# 闌尾切除術利用率分析 —分局別

分局別	2001年			2002年			2003年		
	平均 天數	ICU 比率	人次	平均 天數	ICU 比率	人次	平均 天數	ICU 比率	人次
台北	5.04	2.4%	7,632	5.08	3.6%	7,523	5.06	3.4%	6,554
北區	4.82	1.7%	4,534	4.78	2.8%	4,318	4.92	2.3%	4,175
中區	5.13	2.8%	4,664	5.16	2.9%	4,481	5.34	4.0%	4,193
南區	5.04	2.1%	3,810	5.02	2.0%	3,649	5.08	3.6%	3,336
高屏	4.87	1.5%	4,569	4.98	1.4%	4,555	4.88	2.2%	4,025
東區	5.33	2.0%	851	5.23	3.4%	853	5.29	3.6%	750
<b>合計</b>	<b>5.00</b>	<b>2.1%</b>	<b>26,060</b>	<b>5.02</b>	<b>2.7%</b>	<b>25,379</b>	<b>5.06</b>	<b>3.1%</b>	<b>23,033</b>

資料來源：中央健康保險局90-92年住院醫療費用資料

# 腹膜炎併發症發生率(一)

## ◆ 年齡別

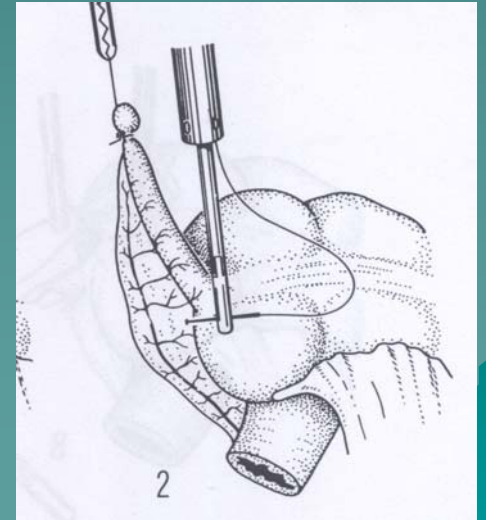
年齡	2001年			2002年			2003年		
	腹膜炎 人次	發生率	總人次	腹膜炎 人次	發生率	總人次	腹膜炎 人次	發生率	總人次
<b>14</b> 以下	59	(2.2%)	2,739	55	(1.9%)	2,828	54	(1.9%)	2,810
<b>15-44</b>	145	(0.9%)	16,123	187	(1.2%)	15,595	168	(1.2%)	14,035
<b>45-64</b>	80	(1.7%)	4,811	92	(2.0%)	4,701	106	(2.5%)	4,225
<b>65</b> 以上	94	(3.9%)	2,387	100	(4.4%)	2,255	77	(3.9%)	1,963

資料來源：中央健康保險局90-92年住院醫療費用資料

腹膜炎定義：當次住院主次診斷之前三碼為‘567’，‘568’之案件

# Appendectomy

- ◆ Open appendectomy (The gold standard) :
  - 1894: McBurney incision ( *Annals of Surgery* ) .
- ◆ Complication rate: 10-20%
- ◆ Problem of Dx Accuracy



# Laparoscopic appendectomy

- ◆ Semm has first performed an incidental appendectomy through the laparoscope in 1983.
- ◆ Schreiber performed laparoscopic appendectomy for acute appendicitis in 1987.



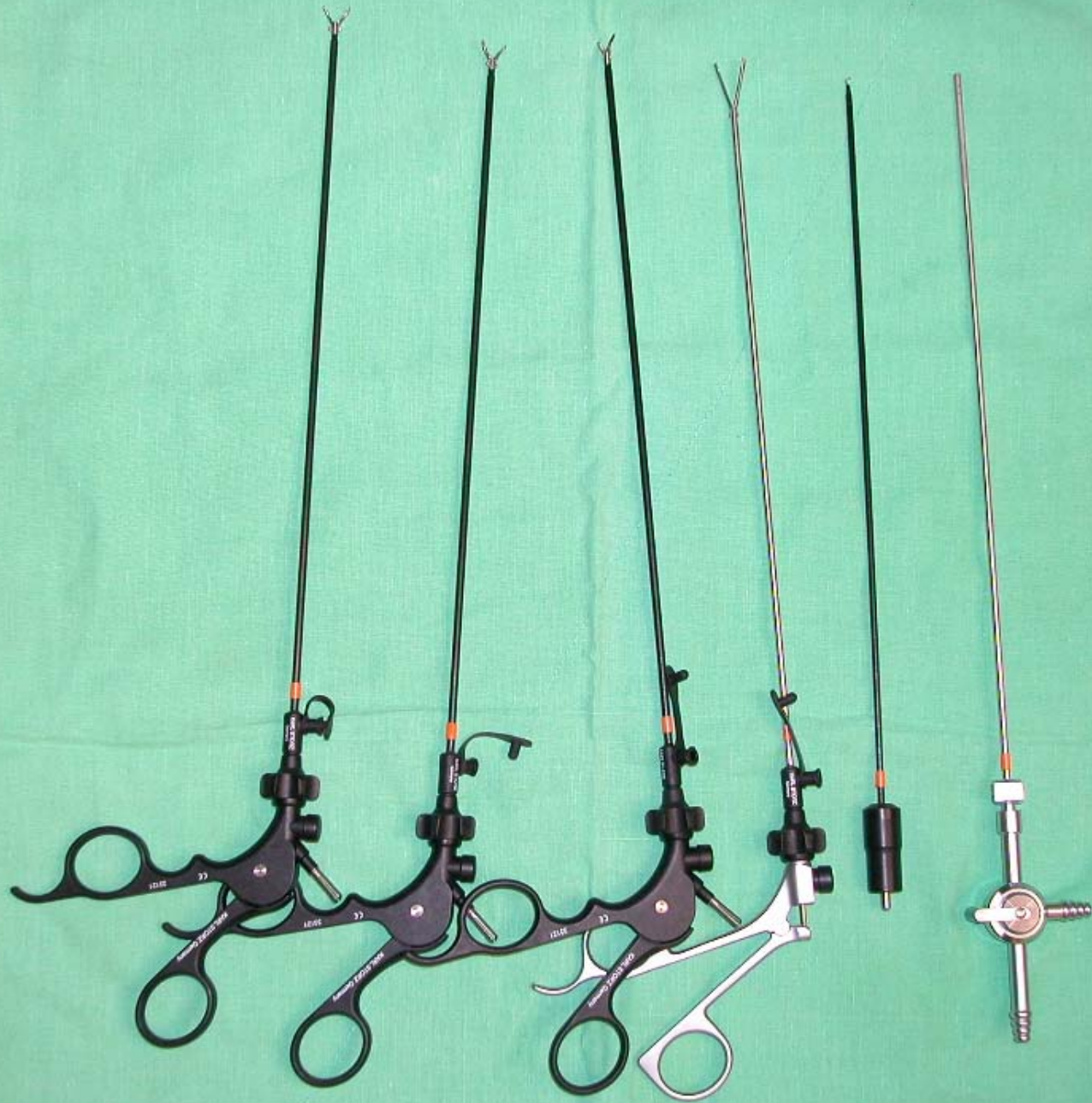
# Laparoscopic appendectomy

- ◆ The large series experience is from Pier et al in 1991:
  1. 639 attempted cases
  2. 70% of cases performed LA
  3. 2% conversion rate
  4. 1% major complication: 3 postoperative abscess, 1 appendiceal stump leakage and 3 bleeding.







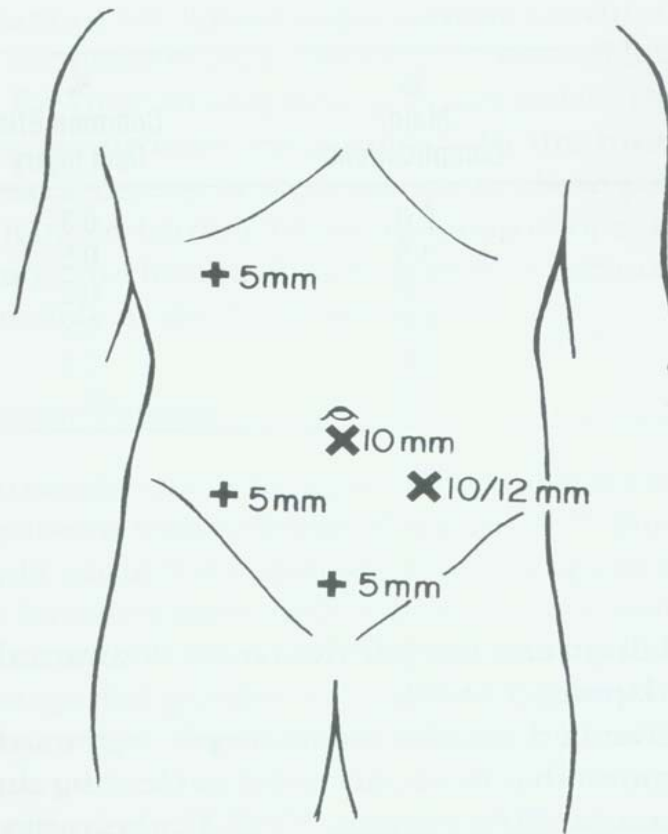


# PreOP Preparation

- ◆ similar to open appendectomy
- ◆ urine catheterization



# Ports site for laparoscopic appendectomy



**Figure 4-16.** Port sites for laparoscopic appendectomy. Primary port sites are indicated by X. Sites for placement of an additional 3rd or 4th port are indicated by +. The umbilical and left lower quadrant ports are generally 10 to 12 mm in diameter.

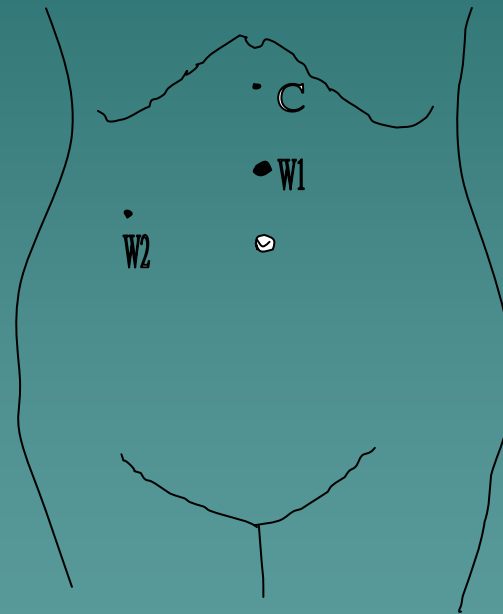
# LA procedure in pregnancy

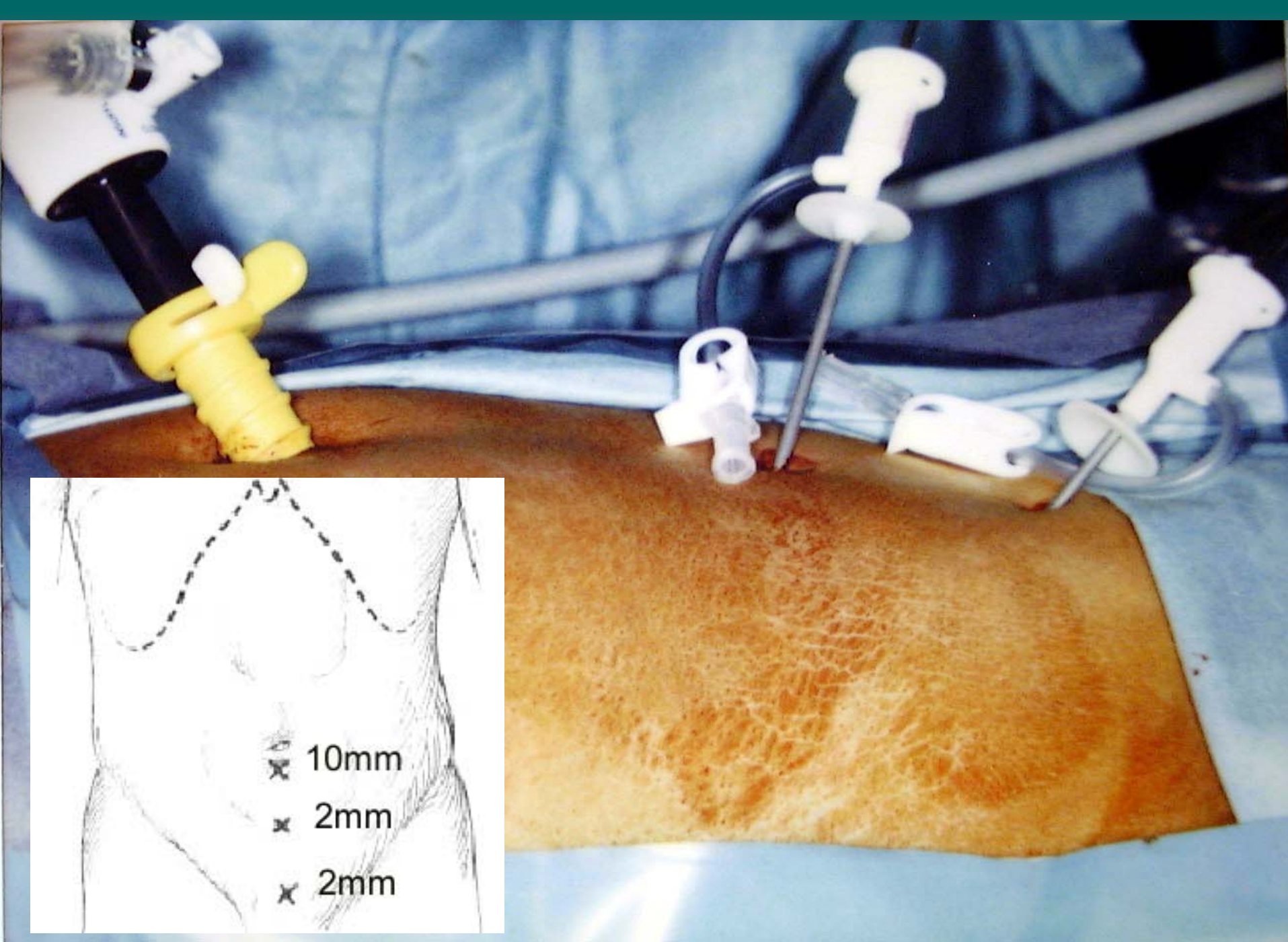
- ◆ Same manner except port sizes and location adapted to the gravid uterus
- ◆ Hasson open technique for the first 10-mm port



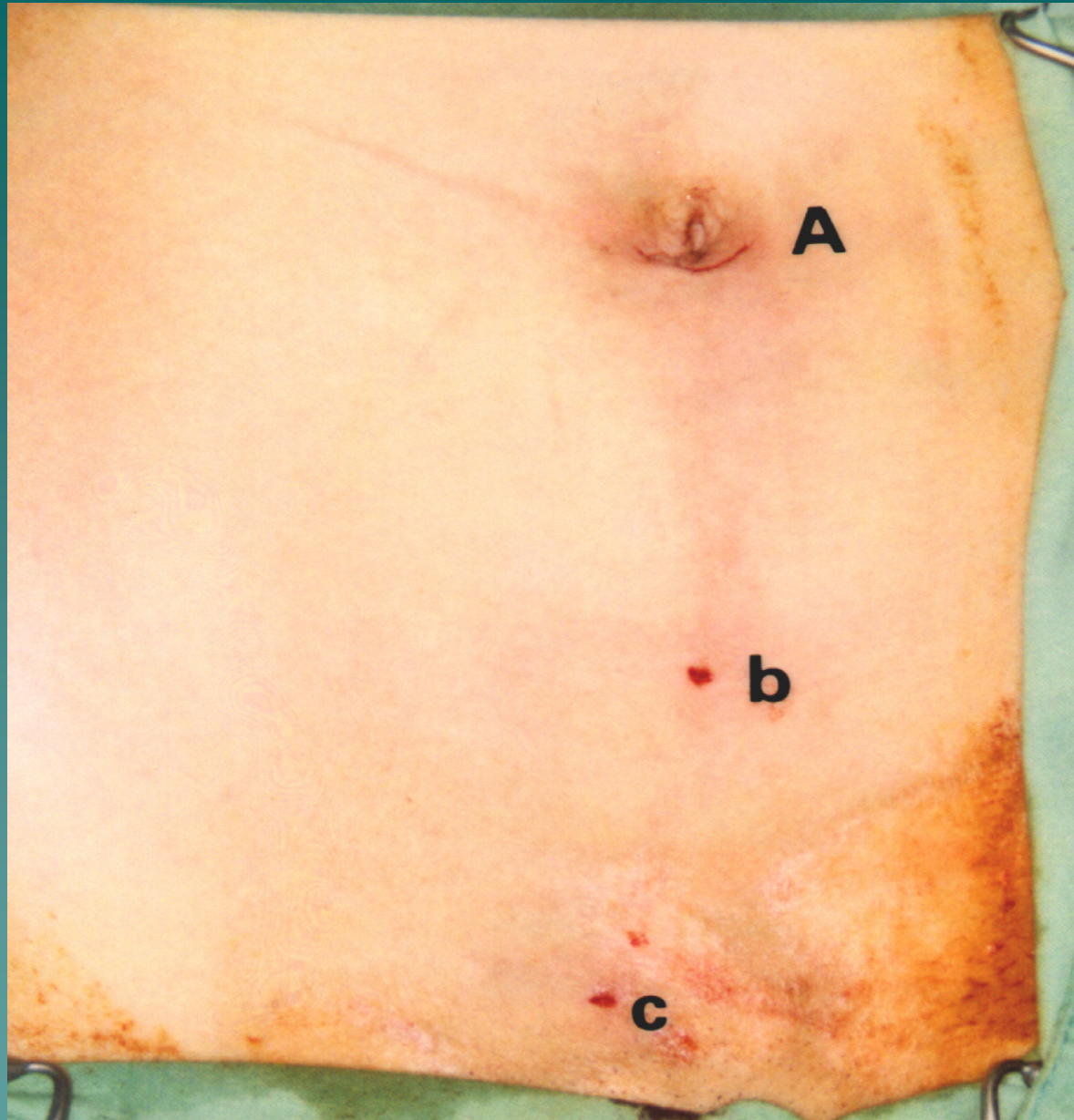
# Port size and location (II)

- ◆ Late second and third trimesters
- ◆ Camera port (C): 5 mm
- Working port (W1): 10 mm
- Working port (W2): 5 mm





x 10mm  
x 2mm  
x 2mm





## *The disadvantage of needlescopic appendectomy*

- **Narrower operative field than 5mm laparoscope**
- **Less visual acuity**
- **Dissection or manipulation of inflammatory or bulky tissue became more difficult with the use of 2-mm instruments**

# Results of prospective randomized study

- ◆ **Equivocal**

Martin et al (1995, Ann S): 169 patients

Cox et al (1996, WJS): 64 patients

McCahill (1996, AJS): 162 patients

- ◆ **Better clinical results**

Reiertsen (1997, BJS): 272 patients

Hellberg (1999, BJS): 523 patients

# Discussion

- ◆ Most of the series with more than 100 LAs supported the laparoscopic appendectomy.
- ◆ Katkhouda et al: intra-abdominal abscess can be reduced by laparoscopic service (Am. J. Surg. 2000).
- ◆ Mastery of the learning curve and addition of specific surgical technique explained the improved result.

# Cochrane database review system

Sauerland et al reviewed 54 series study, 2004

1. **Wound infection** were less likely after LA than after OA, but the incidence of **intraabdominal abscesses** was increased
2. The **duration of surgery** was 12 minutes longer for LA.
3. **Pain on day 1 after surgery** was reduced after LA by 9 mm on a 100 mm visual analogue scale.
4. **Hospital stay** was shortened by 1.1 day
5. **Return to normal activity, work, and sport** occurred earlier after LA than after OA.
6. While the operation costs of LA were significantly higher, the costs outside hospital were reduced.
7. Five studies on children were included, but the result do not seem to be much different when compared to adults.
8. **Diagnostic laparoscopy reduced the risk of a negative appendectomy, but this effect was stronger in fertile women.**



# Cochrane database review system

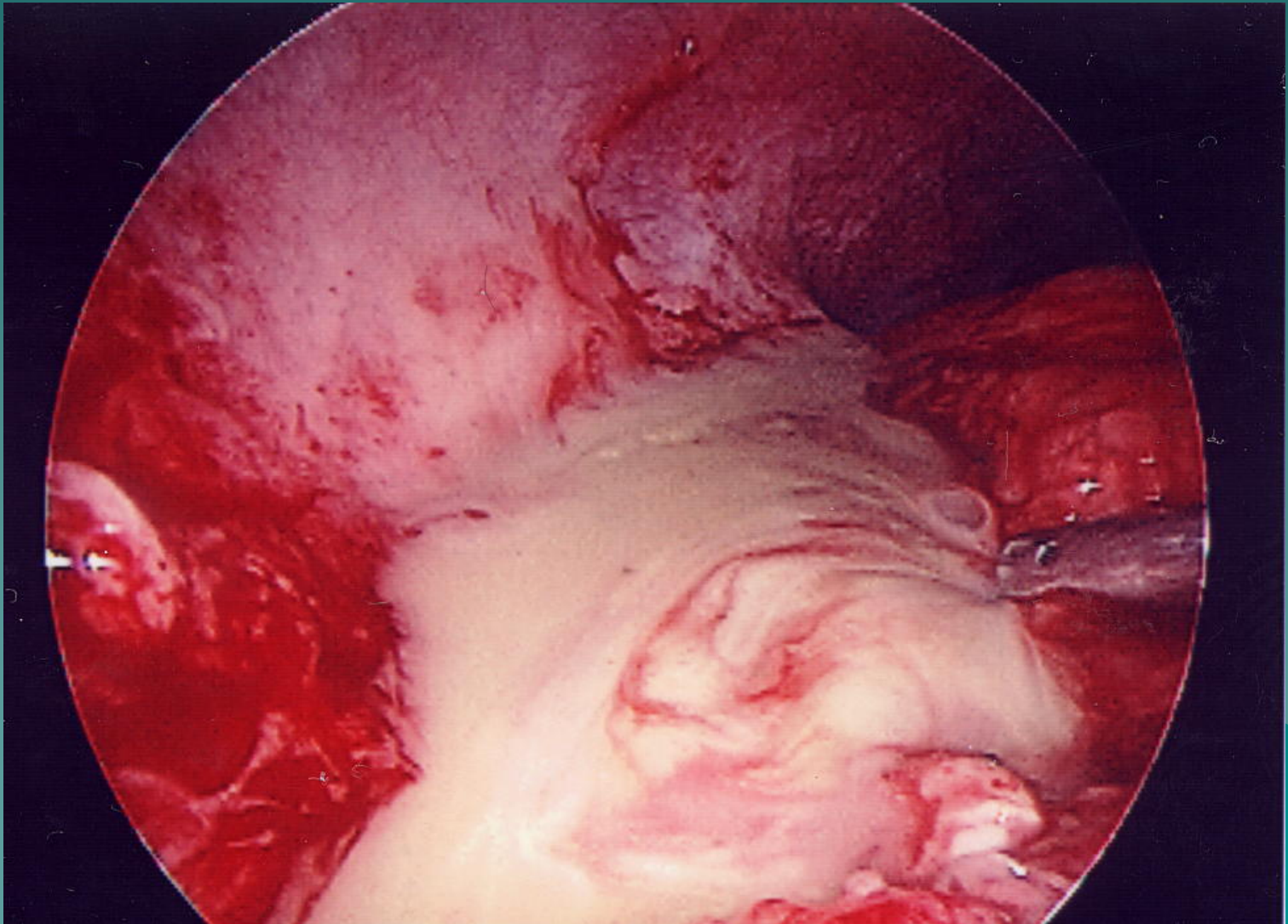
## REVIEWERS' CONCLUSIONS:

1. In those clinical settings where surgical expertise and equipment are available and affordable, diagnostic laparoscopy and LA seem to have various advantages over OA.
2. Recommend to use laparoscopy and LA in patients with suspected appendicitis unless laparoscopy itself is contraindicated or not feasible.
3. Especially young female, obese, and employed patients

## ***Advantage of Laparoscopic appendectomy***

- Laparoscopic has been used as a diagnostic tool to decrease the rate of negative appendectomy and also to avoid unnecessary laparotomy.

# Intraabdominal abscess







# 迷你腹腔鏡闌尾切除術

# 恩主公醫院經驗

## *Operation methods for patients of appendicitis*

	1998-1999 ( 620 )	2000-2001 ( 558 )	2002-2003 ( 506 )
Laparoscopic appendectomy & Conversion	543 (87.58%)	536 (96.06%)	495 (97.83%)
Open appendectomy	72 (11.61%)	18 (3.23%)	9 (1.78%)
Segmental resection	5 (0.81%)	4 (0.72%)	2 (0.40%)
Conversion	20 (3.68%)	6 (1.12%)	4 (0.81%)

# 恩主公醫院經驗

## *Intra-operative findings*

	1998-1999 (543)	2000-2001 (536)	2002-2003 (495)
Inflammation	367	343	321
Gangrenous Change	113	99	111
Ruptured appendicitis	53	69	46
Pus ascites and local abscess	10	25	17

# 恩主公醫院經驗

## *Demographic data of patients*

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	1998-1999 (543)	2000-2001 (536)	2002-2003 (495)
Male / Female	253 / 290	271 / 265	264 / 231
Age	31.45 ± 16.11	31.47 ± 16.47	32.06 ± 16.82
WBC	13066.57 ± 7916.53	13407.26 ± 5372.11	13602.08 ± 4322.74

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# 恩主公醫院經驗

## *Operative results of patients*

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	1998-1999	2000-2001	2002-2003
Operation time (min)	59.41 ± 26.78	60.05 ± 60.36	56.31 ± 25.58
Timing of oral intake (hr)	25.24 ± 22.83	23.65 ± 30.19	20.82 ± 27.45
Hospital stay (hr)	70.21 ± 51.34	73.88 ± 61.75	70.30 ± 51.06
Frequency of analgesic injection (times / stay)	0.68 ± 1.34	0.57 ± 1.37	0.43 ± 0.94

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# 恩主公醫院經驗

## *Morbidities and mortality*

	1998-1999	2000-2001	2002-2003
<b>Total morbidities</b>	<b>45 / 543 (8.29%)</b>	<b>25 / 536 (4.66%)</b>	<b>18 / 495 (3.64%)</b>
<b>Mild wound infection</b>	<b>26 (4.79%)</b>	<b>13 (2.43%)</b>	<b>10 (2.02%)</b>
<b>Severe wound infection</b>	<b>8 (1.47%)</b>	<b>6 (1.12%)</b>	<b>4 (0.81%)</b>
<b>Ileus</b>	<b>7 (1.29%)</b>	<b>4 (0.75%)</b>	<b>2 (0.40%)</b>
<b>Intraabdominal abscess</b>	<b>4 (0.74%)</b>	<b>2 (0.37%)</b>	<b>2 (0.40%)</b>
<b>Mortality</b>	<b>0</b>	<b>0</b>	<b>1 (0.20%)</b>

# Summary

- ◆ The history of surgery of the appendix is a beautiful chapter in medical education.
- ◆ The diagnosis of appendicitis challenges the surgeons' ability.
- ◆ Laparoscopy plays a role in young female, or patients with uncertain diagnosis.
- ◆ In complicated appendicitis, the role of laparoscopy remains to be defined.



***Thanks for your  
attention!!***

恩主公醫院