Laparoscope use and surgical site infections in colon surgery, cholecystectomy, and appendectomy

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Background

CDC guidelines for prevention of SSI

- Patient's preparation (hair, skin)
- Hand/forearm antisepsis
- Management of infected or colonized personnel
- Antimicrobial prophylaxis
- Ventilation
- Environmental surfaces
- Sterilization of instruments
- Surgical attire and drapes
- Asepsis and surgical technique
- Incision care
- Surveillance

(Mangram A. et al. Infect Control Hosp Epidemiol 1999; 20: 247-78)

Background

Laparoscopic approach of cholecystectomy and risk of SSI

SSI/total (%)	
Open surgery	Laparoscopy
229 / 18,079 (**1.3**)	167 / 36,425 (**0.5**)

Adjusted OR: 0.61 [0.51 – 0.74]

But post-discharge follow-up not systematically performed.
Thus, underreporting may have been more important in patients who underwent laparoscopy and who are usually discharged earlier.

(Richards C. Ann Surg 2003; 237:358-362)

Objective

To analyze whether the use of a laparoscope has an independent protective effect for SSI, irrespective of the length of stay, in:

- Colon surgery (COL)
- Cholecystectomy (CCK)
- Appendectomy (APP)

Methods I

- Prospective data collection through a surveillance program using the principles of the NNIS system in 9 hospitals from western Switzerland between1998 and 2005
- CDC definitions of SSI
- Post-discharge follow-up through standardized phone interview at one month (patient, physician) + lab results, x-rays, reports when necessary

Methods II

Statistics

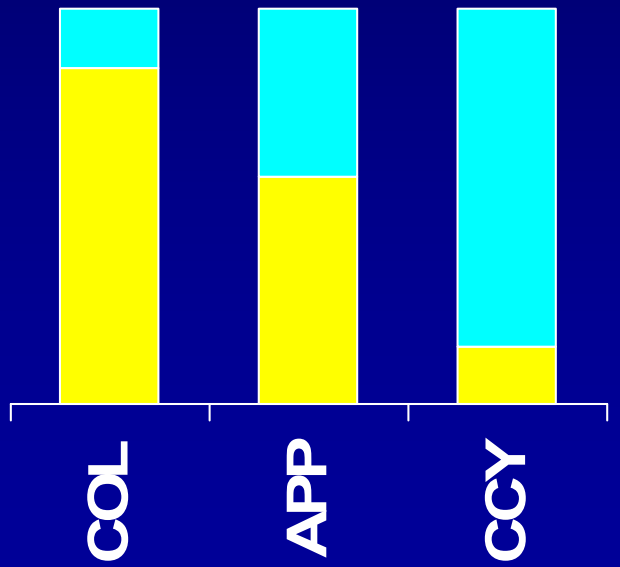
- Comparison of SSI rates between open vs. laparoscopic technique for each procedure

- Identification of factors associated with SSI for each procedure in:
  - univariate analysis: Fisher exact, T-test, Mantel-Haenszel, Chi-square, or Wilcoxon as appropriate
  - multivariate analysis: forward stepwise logistic regression models with initial inclusion of every variable and dummy coding of hospitals (criteria for entry <0.2, criteria for staying <0.05)

Results

Interventions included

Colon (COL):	2,092
Cholecystectomy (CCY):	3,096
Appendectomy (APP):	2,468
Total:	7,656



Laparoscopy

COL: 14.9%

APP: 42.6%

CCY: 85.6 %

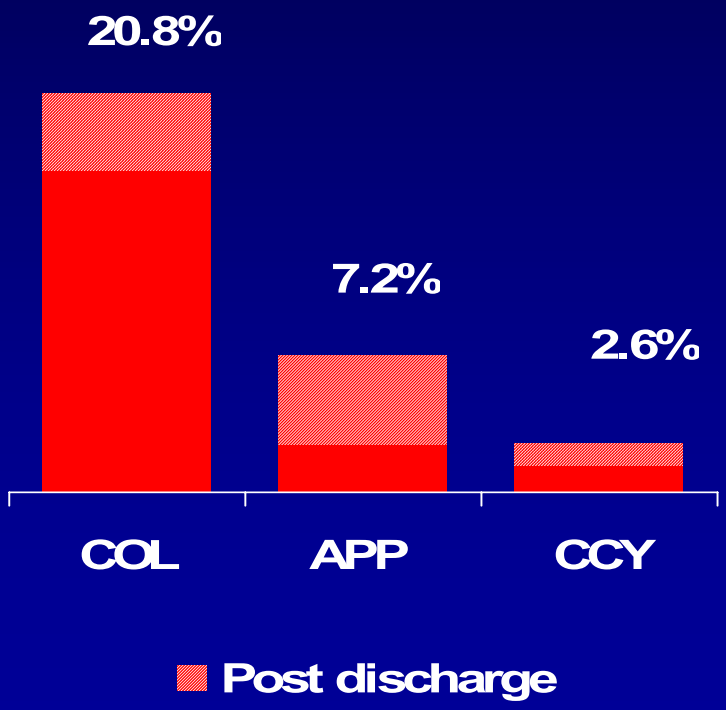
Results

Length of stay and follow-up, by procedure and technique

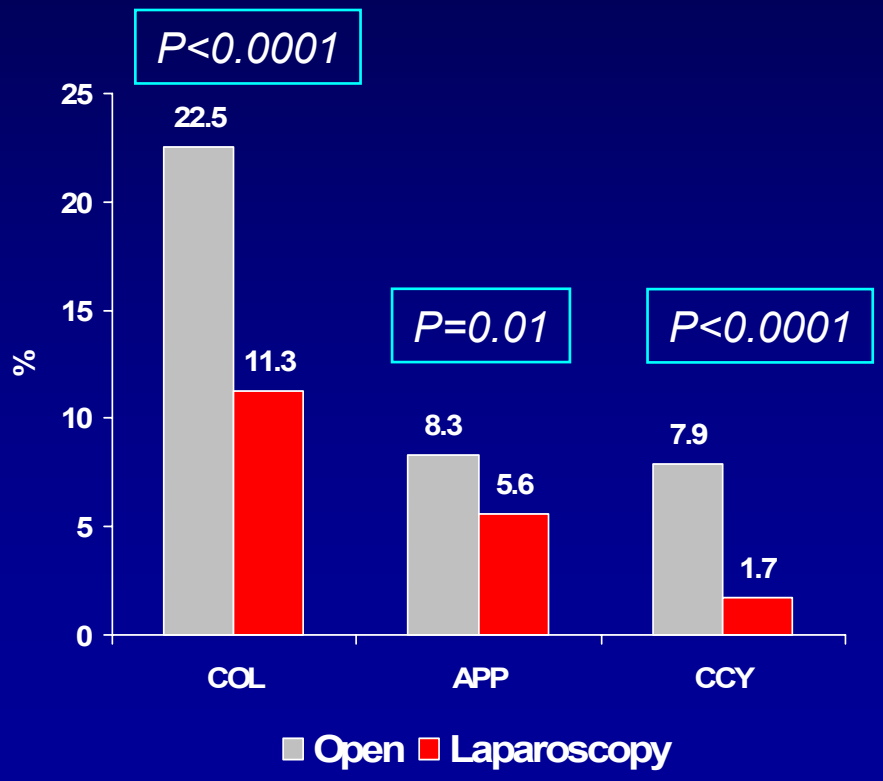
	COL		APP		CCY	
	Scopy	Open	Scopy	Open	Scopy	Open
LOS in days, mean (st. dev.)	12.5 (10.1)	20.3 (15.7)	5.5 (11.8)	6.4 (9.5)	5.9 (5.1)	13.1 (8.7)
1-month f.-up, %	98.1	95.7	92.9	93.2	96.0	96.4

Results

Crude SSI rates by procedure and time of DX



Crude SSI rates by procedure and technique



Factors associated with SSI in univariate analysis, by procedure (I)

	P value COL	P value APP	P value CCK
Contamination class	**<0.0001**	**<0.0001**	**<0.0001**
ASA score	**0.0002**	**0.05**	**0.0001**
Duration of the operation >T	**0.008**	**<0.0001**	**0.02**
Emergency procedure	**<0.0001**	0.63	0.13
>1 procedure (same incision)	0.13	0.77	0.06
Re-intervention for a non infectious complication	**0.001**	**0.0004**	**0.005**

Factors associated with SSI in univariate analysis, by procedure (II)

	P value COL	P value APP	P value CCK
Hospital	**<0.0001**	0.12	0.2
Delay from admission to operation (days)	0.064	0.75	0.15
Age in years	0.46	**0.0004**	**0.023**
Male gender	**0.024**	**0.019**	0.16
Laparoscope use	**<0.0001**	**0.011**	**<0.0001**

Factors associated with SSI in multivariate analysis, Colon surgery

Factor	OR (95% CI)	P value
Contamination Class	1.50 (1.31-1.70)	<0.0001
ASA score	1.17 (1.01-1.36)	0.04
Duration > T	1.39 (1.11-1.76)	0.005
Male gender	1.26 (1.02-1.57)	0.04
Re – intervention	2.27 (1.42-3.60)	0.0005
Hospital E	0.61 (0.38-0.96)	0.03
Hospital G	1.50 (1.09-2.06)	0.01
Hospital H	0.16 (0.06-0.40)	0.0001
Laparoscope use	**0.43 (0.29-0.63)**	**< 0.0001**

Factors associated with SSI in multivariate analysis, Appendectomy

Factor	OR (95% CI)	P value
Contamination Class	2.38 (1.85-3.06)	<0.0001
Duration > T	2.51 (1.76-3.60)	<0.0001
Re – intervention	3.89 (1.56-9.69)	0.004
Hospital B	1.92 (1.16-3.18)	0.01
Hospital E	1.76 (1.09-2.84)	0.02
Hospital G	1.66 (1.02-2.70)	0.004
Laparoscope use	**0.61 (0.43-0.87)**	**0.006**

Factors associated with SSI in multivariate analysis, Cholecystectomy

Factor	OR (95% CI)	P value
ASA score	1.63 (1.18-2.26)	0.003
Re – intervention	4.20 (1.51-11.7)	0.006
Hospital D	2.01 (1.08-3.75)	0.027
Laparoscope use	**0.27 (0.16-0.43)**	**<0.0001**

Conclusion I

- Laparoscopy appears as an independent protective factor for SSI in:
  - Colon surgery
  - Cholecystectomy
  - Appendectomy
- This is not related to the shorter hospital stay observed after laparoscopic procedures

Conclusion II

Limitations

- Only a limited set of variables was available for statistical adjustment. Thus, the models may not have captured all confounding factors
- In particular, no information on antibiotic prophylaxis, body mass index, or indication for surgery
- Operations which began with a laparoscope and ended up as open surgery were entered in the database as open surgery (« as treated analysis »)