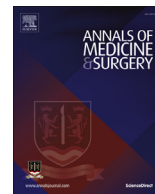




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Clinical strategies to aim an adequate safety profile for patients and effective training for surgical residents: The laparoscopic cholecystectomy model



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HIGHLIGHTS

- Practical training is an essential part in postgraduate programs for Residents.
- Laparoscopy represents a challenging procedure in terms of mentoring.
- Our Program seems to be economically sustainable and clinically feasible.

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ABSTRACT

Background: Training programs for resident surgeons represent a challenge for the mentoring activity. The aim of the present study is to investigate the impact of our training program for laparoscopic cholecystectomy on patient's safety and on the modulation of the residents' exposure to clinical scenario with different grades of complexity.

Material and methods: This is a retrospective study based on a clinical series of laparoscopic cholecystectomy performed in a teaching hospital. Study population was grouped according to the expertise of the attending primary operator among resident surgeons. Four groups were identified: consultant (C), senior resident (SR); intermediate level resident (IR); junior resident (JR). The intraoperative and post-operative outcomes were confronted to evaluate the patient's safety profile.

Results: 447 patients were submitted to LC: 96 cases were operated by a C, 200 by SR, 112 by IR and 39 by JR. The mean operative time was the longest for the JR group. A statistically higher rate of conversion to open approach was registered in C and IR groups in comparison to JR and SR groups. However, in C and IR groups, patients had worse ASA score, higher BMI and more frequent past history of previous abdominal surgery, cholecystitis or pancreatitis. Overall, it was not registered any statistically significant difference among the groups in terms of length of hospital stay and prevalence of major postoperative complications.

Conclusion: Applying an educational model based on both graduated levels of responsibility and modulated grade of clinical complexity can guarantee an high safety profile.

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1. Introduction

Since William Halsted elaborated the concept of graduated

levels of surgical resident responsibility based on years of experience, the debate on the most appropriate management for balancing resident education and patient safety has been always active and intense. Practical training is an essential part in the postgraduate program for surgical specialties but this must be in line with ethical, legal and economic requirements.

Laparoscopy represents a challenging procedure in terms of mentoring since the supervision is often just vocal or requires major changes in the operative settings such as changing the

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operator's position or interruption of the camera shooting. The tutor has less opportunity to manipulate the ongoing procedure compared to open approaches. This could potentially threaten the patient safety.[1].

On the other hand, the laparoscopic approach has become a standard of practice for many interventions nowadays and is routinely performed even at primary-level hospitals. Thus, the development of laparoscopic skills is mandatory in a surgical residency program. Laparoscopic Cholecystectomy (LC) is among the first and the most frequent laparoscopic experience that a trainee attends. The associated outcome may represent a consistent parameter to evaluate the performance of a teaching Surgical Unit in terms of education and patient care.[2,3].

The creation of standardized and structured training program with a detailed job description for each postgraduate year (PGY) has helped to guarantee a better supervision on the step progression of the resident's learning curve; this particularly in view of the acquisition of "validated" skills and "responsible" autonomy.

The aim of the present study was to review the active training program for LC at our Institution, investigating in particular the related impact on the patient's safety and the modulation of the residents' exposure to clinical scenario with different grades of complexity. This analysis was based on the confront of the intra-operative and postoperative clinical outcomes among groups of patients operate by resident surgeons of different grade of experience/PGYs.

2. Methods

This is a retrospective study based on the clinical series of LC performed at the General Surgery Unit of the Academic Hospital of Udine, in the period 2010–2014.

Demographic (gender, age) and clinical data (Body Mass Index (BMI), American Society of Anesthesiology Score (ASA Score), previous medical history of the patient, surgical records (Operative time duration, conversion rate, primary operator and assistant) and postoperative outcomes (hospital length of stay, major postoperative complications) were reviewed from the electronic database and recorded.

A history of cholecystitis, gallstone pancreatitis or previous abdominal operations were selected to classify the clinical case as a potentially complex LC.

LC was always performed according to a standardized technique. The patient was positioned in stirrups with the primary operator standing between the legs. A blunt Hasson trocar was positioned with an open technique. After exploration of the peritoneal cavity other 2–3 trocars were inserted under vision. The dissection of the Calot's triangle was performed to reach the "critical view of safety" with the aim to identify and dissect the cystic duct and cystic artery. Clipping and division of the structures was then carried out. Intraoperative cholangiography was not routinely performed. Retrograde dissection of liver bed was then completed and the gallbladder removed by using an endobag. Drainage was not routinely placed.

Unless specific indications, on POD 1 patients were allowed to eat solid meal and were checked clinically and with laboratory blood test including hemocrome and bilirubin serum level. If the pain was well controlled, the diet was tolerated and the blood tests were within normal value, the patient was discharged on the same day or the following according to the age, other comorbidities or patient's preferences.

The postoperative outcome was evaluated and compared among the different groups in terms of length of hospital stay, prevalence of postoperative complications requiring a second surgical operation or of a radiologic/endoscopic procedure.

To investigate the impact of the different level of technical skills of the resident surgeons on the outcomes the study population was thus divided in groups according to the experience/PGY of the primary operator.

In Italy, the residency training program is structured over 6 years. However to better differentiate the different skills levels among the resident surgeons in our specific training setting, 4 categories of primary operator were identified:

- Consultant MD (C): surgeon with advanced experience in laparoscopic surgery and tutoring;
- Senior Resident (SR): resident MD of PGY 5–6, with a personal surgical record of at least 16 LC as a primary operator; according to the specific job descriptions at our Department, they operate in association with Junior Residents both as primary operator or assistant;
- Intermediate Resident (IR): Resident MD of PGY 3,5, with a personal surgical record of between 5 and 15 LC as primary operator; according to the job description they attend LC as primary operator with the assistance of a C;
- Junior Resident (JR): Resident MD of PGY 2–3, with a personal surgical record of 4 or less LC as primary operator.

Thus, the study population was divided into 4 groups: C, SR, IR, JR.

The Resident MD of PGY 1 and 4 were not included in the study because our residency program schedules just a ward-based clinical training during the PGY 1 and a clinical/surgical training at different Regional Hospitals within the local District during the PGY 4.

Statistical analysis consisted of one-way analysis of variance among the 4 study groups (C, SR, IR, JR). This was followed by independent sample tests with the Bonferroni correction for multiple comparisons. X² and Fisher's exact tests were used for comparison of proportions with $P \leq 0.05$ considered significant throughout. Continuous data are presented as mean standard deviation.

Table 1
Demographic and clinical characteristics of patients.

Gender (n°/percentage)	
Female	246 55%
Male	201 45%
Age (Years)	
Mean ± DS	54.10 ± 15.42
BMI	
Mean ± DS	26.82 ± 5.16
ASA (n°/percentage)	
1	271 60.60%
2	135 30.20%
3	16 3.60%
missing	25 5.60%
Potential complexity (n°/percentage)	
	82 18.3%
Procedure years (n°/percentage)	
2010	96 21.50%
2011	100 22.40%
2012	88 19.70%
2013	85 19.00%
2014	78 17.40%
Operating Room Time (minute)	
Mean ± DS	77.91 ± 33.20
Conversion (n°/percentage)	
	24 5.40%
Hospital stay (day)	
Mean ± DS	2.12 ± 3.13
ERCP/Radiologic procedure (n°/percentage)	
	7 1.50%
Relaparotomy (n°/percentage)	
	7 1.50%

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