First Multicenter Study of novel digital surgical assistant used in laparoscopic cholecystectomy: Feasibility and Safety in 100 Cases

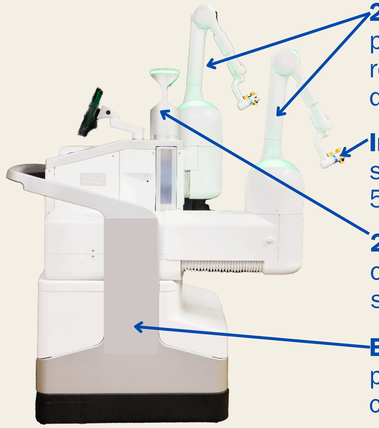
H Mercoli, MD[1]; M Nedelcu, MD[2]; B Cadiere, MD[3]; DS Keller MS MD[4]; DAzagury, MD[5]

[1]PFC - ELSAN; [2]Bouchard- ELSAN; [3]Arnault Tzanck Institute; [4]Université de Strasbourg, Stanford University [5]

Contact: docteur.mercoli@gmail.com

INTRODUCTION

The Maestro™ system (Moon Surgical, Paris, France), is a next-generation digital robotic assistant. The AI-guided ScoPilot™ system enables instrument pairing and following, and was used at the surgeon's discretion. This study aimed to evaluate the feasibility and safety of the Maestro platform in performing laparoscopic cholecystectomy (LC).



2 hypersensitive robotic arms
provides stable vision and precise retraction, rapidly adaptable for multi-quadrant surgery

Instrument graspers
supports off-the-shelf instruments 5mm or 10mm in diameter

2 x 3D cameras
collect RGB-D data about the surrounding environment

Edge-computing GPU
performs high speed real-time computer vision analysis

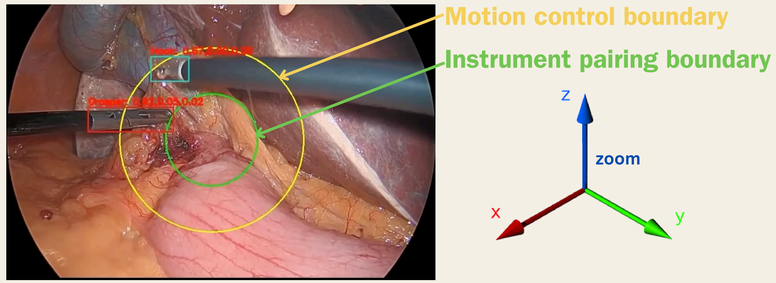
METHODS

This retrospective analysis examined a prospectively gathered multicenter series of 100 patients undergoing elective Maestro-assisted laparoscopic cholecystectomy (MLC) at two surgical centers in France (Nice, Besançon), with procedures performed by senior surgeons.

Key metrics collected were patient demographics, operation duration, robotic setup time, and outcomes. Safety was evaluated based on intraoperative /postoperative complications and the need for conversion. ScoPilot AI was implemented to eliminate the need for manual laparoscope adjustments, and enabled its positioning by following the active instrument through computer vision analysis.

ScoPilot

AI-guided ***camera control*** and ***instrument following*** intelligently adjusts to the laparoscope's change in positioning (pitch/way), and depth (zoom) to maintain optimal visualization.



Avg. operating time	45 mins ± 23
Ambulatory patient rate	83%*
Postop complication rate	4%**
Setup time	5 mins ± 2

RESULTS

The study included 100 patients (mean age: 58 years ±18, BMI: 27 kg/m² ±6, ASA 2). In all cases, Maestro provided stable vision and reliable retraction, enabling clear visualization of the critical view of safety (CVS) and safe dissection.



- **Maestro performed successfully in 100% of the cases**
- **No device-related adverse events**
- **No open conversions**
- **10 cases of successful solo surgery**

CONCLUSION

The Maestro system was shown to be **safe and feasible in all 100 cases with no adverse events** directly related to the system. Maestro advantages during surgery:

- Advanced AI-enhanced visualization
- Reliable gall bladder retraction
- Efficient use of technicians and staff

**Above French standards **Complications unrelated to Maestro operation included: Clavien I (n=1), II (n=2), Clavien IIIA (n=1)*