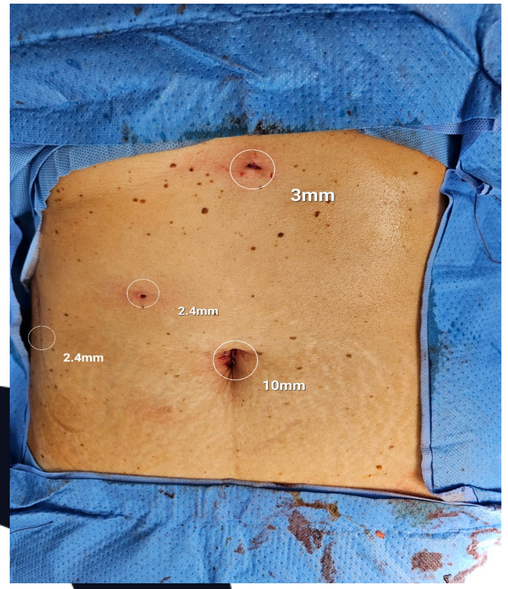
Evaluation of the feasibility and safety (by the correct obtaining of the Critical View of Safety) using Mini-laparoscopic devices and percutaneous handles during the different degrees of complexity in the laparoscopic cholecystectomy

Gabriel Rangel-Olvera[1,2]; Bianca Alanis-Rivera[1,3]; Mario Alberto Gallardo-Ramirez[1]; Ignacio Del Rio-Suarez[1,4]; [1]Hospital Angeles Universidad; [2]ISSSTE Tlahuac; [3]Instituto Nacional de Cancerologia; [4]Hospital General "Dr. Manuel Gea Gonzalez"

Introduction: The benefits of Laparoscopic cholecystectomy (LC) as the preferred procedure for symptomatic cholelithiasis have demonstrated superior outcomes compared to the open approach; including reduced postoperative pain, shorter hospital stays, earlier resumption of activities, improved cosmesis, and enhanced patient satisfaction. The mini-laparoscopic cholecystectomy (MLC) using trocars/ports smaller than 5mm has been extensively studied and proven feasible. However, there is a lack of research employing this approach to assess the attainment of the Critical View of Safety (CVS). This study aims to evaluate the efficacy and safety (specifically, the objective achievement of CVS) of MLC (utilizing 2mm percutaneous devices) and its correlation with varying intraoperative complexity.



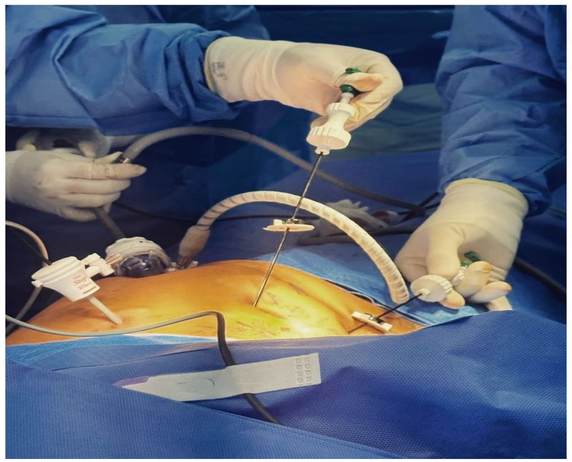
Methods: A prospective study was conducted to assess the demographic and surgical variables of the MLC performed by a surgical team between March 2021 and January 2024. The MLC was performed using a 10 mm trocar for the scope, one 3 mm subxifoid trocar, and two Percutaneous minilaparoscopic handles (Teleflex Incorporated, Morrisville, NC, USA), adhering to the conventional 4-port LC technique. Patients were discharged within the first 24 hours post-surgery, and provided with mild analgesics and prophylactic antibiotics.

	Not Satisfactory CVS	Satisfactory CVS	
Conversion			p
No	18 (25.71%, 36.73%)	31 (44.29%,63.27%)	
Si	1 (1.43%, 4.76%)	20 (28.75%, 95.24%)	0.006
Complejidad			p
CLnC	13 (18.57%, 35.14%)	24 (34.29%, 64.86%)	
CLC	6 (8.57%, 18.18%)	27 (38.29%, 81.82%)	0.111

Results: A total of 70 patients were recruited, with a female predominance (54, 77.14%) and a majority undergoing elective surgery (43, 61.43%). The intraoperative complexity, as assessed by the Parkland grading scale (PGS), was distributed as follows: 21 patients presented with PGS G1 (30%), 16 with PGS G2 (22.86%), 17 with PGS G3 (24.29%), 9 with PGS G4 (12.86%), and 7 with PGS G5 (10%). As anticipated, a higher PGS was associated with an increased likelihood of conversion from the percutaneous handle to minilaparoscopic or conventional trocar (OR 2.15, p=0.008) or conversion of the Minilaparoscopic Subxiphoid trocar to conventional trocar (OR 1.73, p=0.01). Notably, all patients who experienced either conversion (percutaneous or minilaparoscopic) had a PGS greater than 3. The CVS was deemed satisfactory (Doublet score of 5 or 6) in 51 patients (72.86%). However, a significantly higher risk of not achieving a satisfactory CVS was observed with increasing PGS (OR 1.71, p=0.014, 95% CI: 1.11-2.62). Furthermore, 12 patients (17.14%) required additional analgesics, primarily due to conversion of the trocars (either: OR 5.06, percutaneous: OR 13.5, minilaparoscopic/subxiphoid: OR 2.86) or a more complex cholecystectomy (all conversion presented a PGS>3).

Table 1. Desciptive analysis

Demographic variables			
Sex		Type of surgery	
Female	54 (77.14%)	Elective	43 (61.43%)
Male	16 (22.86%)	Urgent	27 (38.57%)
Surgical variables			
Complexity		Surgical times	
Parkland		Time before clipping the cystic structures	32.91 +-8.55 (18-51)
1	21 (30%)	Time for the dissection of the gallbladder from the liver	7.04+-3.04 (3-16)
2	16 (22.86%)	Time for the extraction of the gallbladder	5.72 +-2.39 (2-14)
3	17 (24.29%)	Time for hemosthasia and aspiration of the Surgical site	4.11+- 1.54 (1-7)
4	9 (12.86%)	Total laparoscopic time	49.8+-13.75(28-85)
5	7 (10%)	Total surgical time	58.34+-14.38(36-94)
Not complex MLC	37 (52.86%)	Estimated Blood lose	30.78+-24.63 (5-80)
Complex MLC	33 (47.14%)	Conversion	
Satisfactory Crital view of safety	51 (72.86%)	Conversion of Subxifoid trocar	21 (30%)
Subtotal Cholecystectomy	9 (12.86%)	Conversion of Percutaneus handle	10 (14.29%)
More Analgesics	12 (17.14%)		





Conclusion: The minimally invasive laparoscopic approach and the utilization of percutaneous handles have demonstrated their safety and feasibility, even in intricate laparoscopic cholecystectomies. This technique does not compromise essential safety measures, such as the objective attainment of the Critical View of Safety. Moreover, it offers the advantage of reduced postoperative pain compared to the conventional laparoscopic approach.

References
*Coletta, D., Mascioli, F., Balla, A., Guerra, F., & Ossola, P. (2021). Minilaparoscopic Cholecystectomy Versus Conventional Laparoscopic Cholecystectomy: An Endless Debate. *Journal of laparoendoscopic & advanced surgical techniques. Part A*, *31*(6), 648–656. *Madni, T. D., Leshikar, D. E., Minshall, C. T., Nakonezny, P. A., Cornelius, C. C., Imran, J. B., Clark, A. T., Williams, B. H., Eastman, A. L., Minei, J. P., Phelan, H. A., & Cripps, M. W. (2018). The Parkland grading scale for cholecystitis. *American journal of surgery*, *215*(4), 625–630. *Sanford, D. E., & Strasberg, S. M. (2014). A simple effective method for generation of a permanent record of the Critical View of Safety during laparoscopic cholecystectomy by intraoperative "doublet" photography. *Journal of the American College of Surgeons*, *218*(2), 170–178.