

## Case study

# THE LAPAROSCOPIC CHOLECYSTECTOMY WHEN TO CONVERT

## ABSTRACT

Laparoscopic cholecystectomy is considered the gold standard in gallbladder surgery across all clinical contexts. Contraindications to laparoscopic cholecystectomy are rare; however, a significant proportion of patients may face challenges leading to unsuccessful laparoscopic procedures, necessitating conversion to open surgery due to technical difficulties or intraoperative complications. It's important to note that conversion should not be perceived as a failure but rather as a safety measure for the patient. Factors contributing to conversion may include surgeon-related, patient-related, and occasionally equipment-related issues. The aim of our study is to identify indications and assess the conversion rate to conventional surgery among 31 out of 1052 patients who underwent laparoscopic cholecystectomy during our study period. We seek to analyze the experience of the Visceral Surgery Department (Wing 1) at CHU Ibn Rochd University Hospital in Casablanca regarding the conversion of laparoscopic cholecystectomies to conventional surgery and to compare our findings with those reported in the literature

**KEYWORDS :** cholecystectomy, laparoscopy, conversion

## INTRODUCTION

Cholecystectomy is reputed to be a benign operation the most common form of visceral surgery, but its consequences can be severe if complications arise, leading in extreme cases to liver transplantation (1). Laparoscopic cholecystectomy is the gold standard in gallbladder surgery, whatever the clinical context, although conversion to open surgery may be necessary due to technical difficulties or intraoperative complications. Conversion to laparotomy should not be seen as a technical failure but rather accepted as a therapeutic complement to change the surgical technique, often protecting the patient from complications. The aim of our study was to identify the conversion rate and predictive factors for open surgery in 31 patients out of 1052 patients who underwent laparoscopic cholecystectomy in the visceral surgery department of the Ibn Rochd University Hospital in Casablanca, and to compare them with data in the literature.

## MATERIALS AND METHODS

This is a retrospective descriptive and analytical study of conversion to laparotomy during laparoscopic cholecystectomy in 1052 patients who underwent operated, which covers a 5-year period from 1 January 2016 to 31 December 2020. The data was collected using a data sheet, and hospital registers, as well as operative reports, enabling the various clinical,

paraclinical, therapeutic and evolutionary parameters to be collected and analysed,therapeutic and evolutionary parameters.

## RESULTS

The frequency of conversion during the period of our study, 1052 patients underwent laparoscopic cholecystectomy, 31 of whom were converted to open laparotomy, i.e. 2.95% of cases

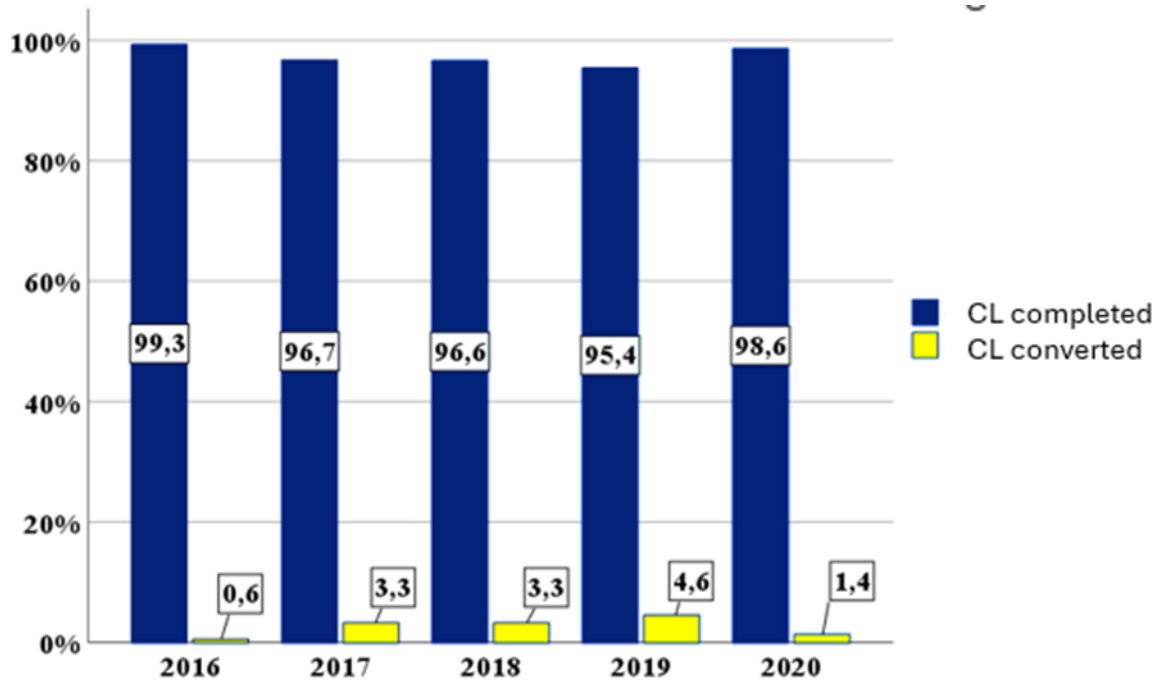


Figure 1 :Conversion frequency over the years

the average age of patients who have undergone laparoconversion is 54. The 61-70 age group predominates in 5.5% of cases, with extremes of 35 and 75. The sex ratio of patients who underwent conversion was 0.476, with 68% women and 32% men.

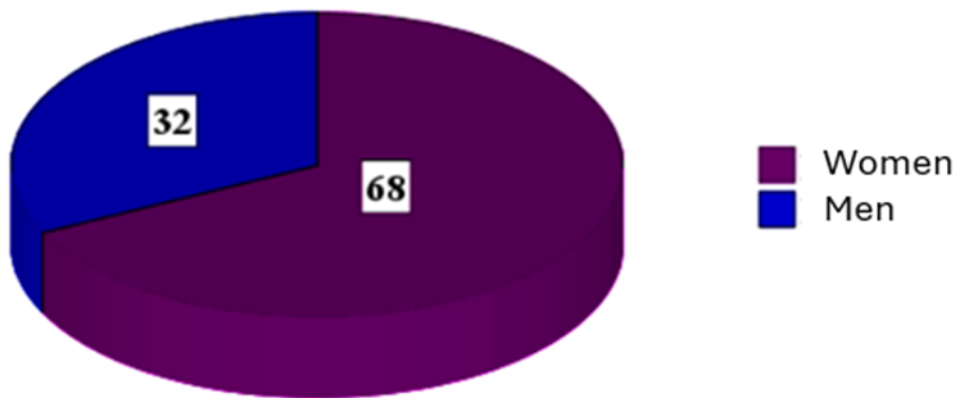
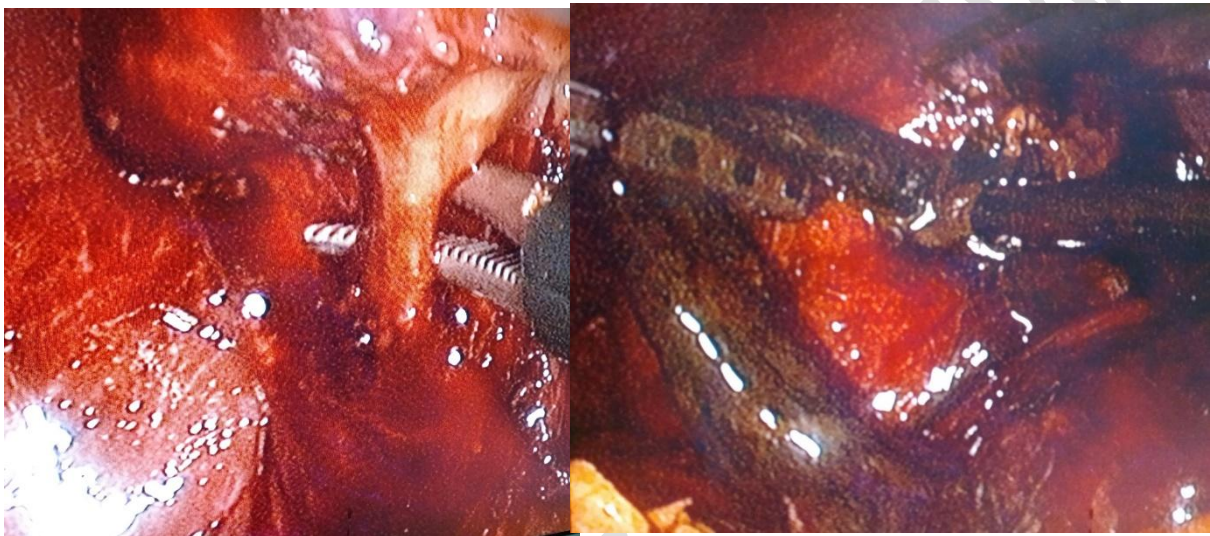


Figure 2 :Distribution of patients with converted LC by sex

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The Medical history was dominated by diabetes with 5 cases (16.13%), hypertension and biliary pancreatitis. Liver colic was among the most marked functional signs. physical examination showed a high BMI and a positive Murphy's sign in 23% of patients who underwent conversion. Biological tests were often disturbed in patients who had undergone converted cholecystectomy, These included a 58% rise in CRP, a 25.8% rise in hyperglycemia and a 16.1% rise in PAL, Any disturbance in this balance prompted patients to be balanced before being scheduled for surgery. Ultrasound evoked uncomplicated vesicular lithiasis in 83% of patients who underwent CL to completion, and 45% of patients who required conversion, with conversion patients more frequently presenting a thick-walled gallbladder in 35%, a sclero-atrophic gallbladder in 16% and a hydrocholecystis with lithiasis enclosed at infundibular level, we found that the indications for conversion in our series were dominated by tight subvesicular adhesions in 35.48%, followed by pediculitis and pyo-cholecystis.



*Figure 3: gangrenous gallbladder with pediculitis*

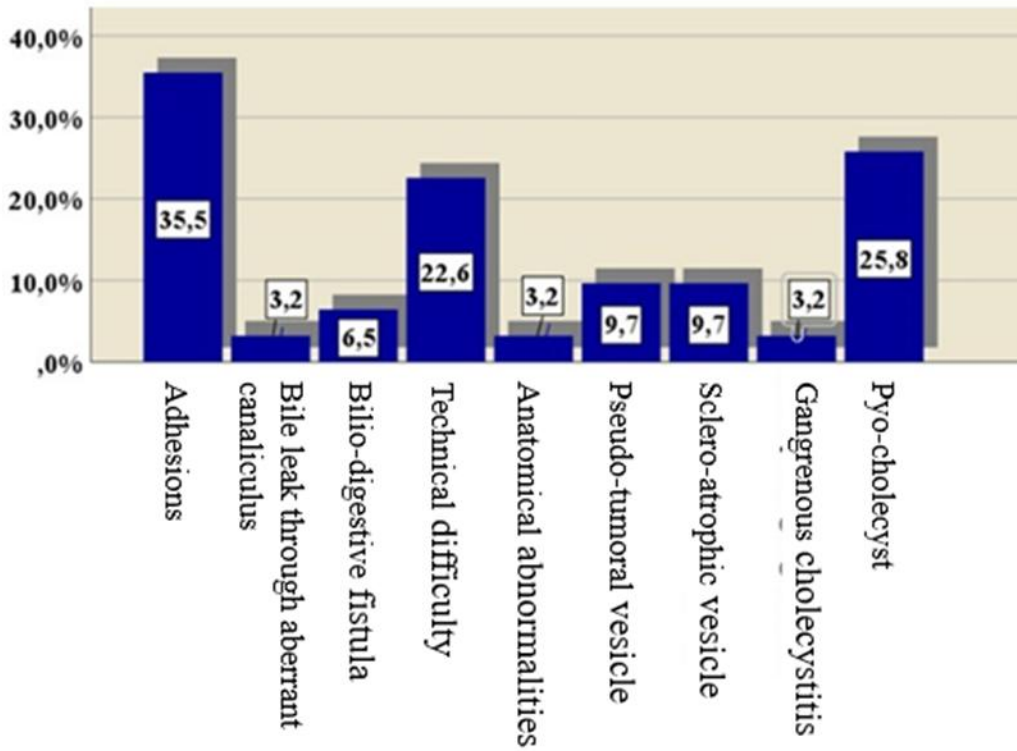


Figure 4 : Indications for conversion to conventional cholecystectomy.

Univariate analysis of variables associated with conversion were as follows: male sex ( $p=0.038$ ), obesity ( $p=0.000$ ), increased alkaline phosphatase ( $p=0.023$ ) and complicated vesicular lithiasis ( $p=0.000$ ) as risk factors for conversion to conventional surgery. However, the age group between 61 and 70 had the highest conversion rate at 5.5%.

	Variables	P	OP	CI 95%	
				Lower bound	Upper bound
<b>Sex</b>	Male vs. Feminine	0,038	2,298	0,94	5,619
<b>Obesity</b>	Yes vs. No	0.000	7,352	3,105	17,409
<b>Hyperleukocytosis</b>	Yes vs. No	0,701	0,613	0,05	7,458
<b>Augmented PAL</b>	Yes vs. No	0,023	0,188	0,044	0,795
<b>High CRP</b>	Yes vs. No	0,927	0,907	0,111	7,428
<b>Thick wall</b>	Yes vs. No	0,749	1,204	0,387	3,742
<b>Complicated LV</b>	Yes vs. No	0.000	0,108	0,037	0,317
<b>History of diabetes</b>	Yes vs. No	0,412	0,607	0,184	2
<b>Age</b>	≥60 vs. <60	0,377	0,668	0,273	1,635
<b>ATCD of anterior abdominal surgery</b>	Yes vs. No	0,881	0,871	0,144	5,262

Figure 5 :Risk factors for conversion of laparoscopic cholecystectomies.

Post-operative follow-up was favourable in 99% of cases where CL was performed and in 71% of cases where conversion was performed. Patients who underwent conversion had more postoperative complications, mainly wall infection in 10% of cases and haemorrhage in a further 10%. The average length of stay for patients who had undergone cholecystectomy was 4.5 days. It ranged from 2 to 15 days, whereas for patients who had undergone conversion, the duration was greater, at 6.19 days. It ranged from 3 to 10 days.

## DISCUSSION

Laparoscopic cholecystectomy is the gold standard treatment for benign gallbladder disease, allowing patients to be taken orally at an earlier stage and reducing the length of hospital stay. This procedure promotes a faster return to normal activity, improves aesthetics and reduces postoperative pain compared with open cholecystectomy. However, some cases still require conversion to laparotomy (1). Despite the growing experience of laparoscopic surgery, approximately 2 to 15% of patients have been converted to open surgery for various reasons (2). The conversion rate to laparotomy ranged from 0.65% to 11.93%. Comparing our results with those in the literature, our conversion rate is close to most published studies. According to numerous studies (3) (4) (5) (6) (7), the conversion rate increases with advanced age (over 50 or 65) and is therefore considered to be a predictive factor for conversion, which is in line with the results of our series. The sex ratio of patients undergoing conversion in our study was 0.476. However, the conversion rate was higher in men ( $p=0.038$ ): 7.75% of men required conversion to open laparotomy compared with 2.35% of women. This is in line with the data reported in the literature, in which male sex is considered to be a predictive factor for conversion (8) (9) (6) (3) (10) (11). Other authors have also considered diabetes and the patient's Body Mass Index as potential statistically significant risk factors for laparoscopic conversion (12). In Moroccan studies (13) (14), the sensitivity of the right hypochondrium is predominant compared with the Murphy's sign. In other series, the frequency of sensitivity of the right hypochondrium varies respectively from 47.3 to 70% and that of Murphy's sign from 10 to 36.6% (14) (16) (12). In our series, the physical examination was often marked by sensitivity of the right hypochondrium (87% of cases). Murphy's sign was found in 23% of

cases. Patients who had undergone a converted cholecystectomy had a more frequent disturbance of the biological work-up than patients who did not require conversion, particularly with regard to CRP elevation (58%), biological cholestasis (32.3%) and alkaline phosphatase elevation (16.1%), as described in the literature, which points to the possibility of predicting the need for conversion on the basis of a disturbed biological profile. Patients who have undergone conversion are more likely to have cholecystitis on ultrasound than those who have undergone CL. Numerous studies show that the presence of cholecystitis on ultrasound combined with other factors contributes to the possibility of conversion, which is in line with the results of our study (2) (4) (6) (17). Conversion of the laparoscopic approach to open laparotomy must be part of the operative programme and carried out whenever the surgeon is unable to apply the recommended tactics, when decision to convert is taken, it should not be seen as a failure but rather as a wise failure, but rather as a wise decision that minimises complications and complications and as a sign of surgical maturity (18) (19). With regard to the indications of conversion, an analysis of the conversion rate and the reasons for conversion reveals several factors, including: Adhesions, technical difficulties and equipment failure, difficult dissection at the level of the calot triangle, anatomical anomalies, sclero-atrophic gallbladder, hepatic cirrhosis, Intra-operative complications, i.e. haemorrhage, biliary and visceral trauma, gallbladder perforation with intra-peritoneal dissemination of stones, bilio-digestive fistulas and complicated vesicular lithiasis, The limited experience of a doctor performing laparoscopic cholecystectomy is also considered to be a statistically significant conversion factor (20).

Table 1. Predictive factors for conversion in patients with acute cholecystitis.

The predictive factors for conversion in patients with acute cholecystitis					
Total population n = 493	Conversion : yes n=56	Conversion : non n=437	P (Univariate)	P (Multivariate)	ORM (IC 95%)
Gender (male)	<b>44,64%</b>	<b>25,62%</b>	<b>0,003</b>	<b>0,012</b>	<b>2,15 1,18-3,9</b>
Middle age	55,59	52,52	0,15		
Diabetes	<b>28,57%</b>	<b>14,64%</b>	<b>0,008</b>	<b>0,019</b>	<b>2,22 1,13-4,33</b>
High blood pressure	35,71%	27,23%	0,18		
Heart disease	<b>5%</b>	<b>3%</b>	<b>0,41</b>		
Duration of symptoms (days)	2,79	2,24	0,005	0,83	
Temperature (C)	<b>37,69</b>	<b>37,59</b>	<b>0,22</b>		
Defense to palpation	50%	27,23%	0,001	0,11	
White blood cell rate (x 10 <sup>9</sup> /l)	12,69	12,09	0,3		
Total bilirubin level (mg/dl)	<b>19,49</b>	<b>16,45</b>	<b>0,038</b>	<b>0,045</b>	<b>1,02 1-1,05</b>
small-vesicular effusion	10,71%	3,20%	0,018	0,74	
gallbladder wall thickness (mm)	5	4,4	0,004	0,31	
Gangrenous cholecystitis	17,43%	10,66%	0,024	0,73	
TG13: Moderate CA	<b>78,57%</b>	<b>43,70%</b>	<b>&lt; 10<sup>-3</sup></b>	<b>&lt; 10<sup>-3</sup></b>	<b>4,44 2,25-8,74</b>

CI: Confidence interval; TG13: Tokyo 2013 classification; In bold: significant variables in multivariate study

As far as the post-operative follow-up is concerned, our results are in line with those of the literature consulted, based on the analysis of post-operative complications of converted laparoscopic cholecystectomy in different series of the literature. We found that they combined those of both the laparoscopic and open routes. The mortality rate for laparoscopic cholecystectomy in the series consulted varies between 0 and 0.2%; in our series there was no mortality.

## CONCLUSION

Laparoscopic cholecystectomy has become the procedure of choice for the management of symptomatic gallbladder disease. However, there is still a significant proportion of patients in whom laparoscopic cholecystectomy cannot be performed successfully and for which conversion to open surgery is necessary, which is linked to factors related to the surgeon, factors related to the patient and his pathology, factors related to the laparoscopic equipment and the anatomical variety. Our work reported causes and a conversion rate that compared favourably with the rates reported in the literature.

## References:

1. Rosen M, Brody F, Ponsky J. Predictive factors for conversion of laparoscopic cholecystectomy. *Am J Surg.* sept 2002;184(3):254-8.
2. Alponat A, Kum CK, Koh BC, Rajnakova A, Goh PM. Predictive factors for conversion of laparoscopic cholecystectomy. *World journal of surgery.* 1997;21(6):629-33
3. Jeffrey H. Peters, MD, Wachaikrailadisiri, Raffaello Incarbone. Reasons for conversion from laparoscopic to open cholecystectomy in an urban university hospital. *urban university hospital. Los Angeles, California: the American journal of surgery, December 1994. volume 168.*
4. Gerald M. Fried, MD, FRCSC, FACS, Jeffrey S. Barkun, MD, FRCSC. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. *THE AMERICAN JOURNAL OF SURGERY, JANUARY 1994. VOLUME 167.*

5. Chi-leung Liu, FRCS(Edin), Sheung-tat Fan, MS, FRCS(Glas) and Lai, Edward C. S. Factors Affecting Conversion of Laparoscopic Cholecystectomy to Open Surgery. *Open Surgery*. (Arch Surg. 1996;131:98-101)
6. Gried G.M, Barkun J.S, Sigman H.H. Factors determining conversion to Laparoscopic cholecystectomy. *Amjsujr*, 1994. 167:35-41.
7. Morel, M. Gonzalez C. Toso G. Zufferey T. Roiron P. Majno G. Mentha P. When should a cholecystectomy be performed? Not always a simple decision. Switzerland: *Rev Med*, 2006. 1T31440.
8. Volkan Genc, Marlen Sulaimanov, Gokhan Cipe, Salim Ilksen Basceken. What Requires Conversion to Open Cholecystectomy? A retrospective analysis retrospective of 5164 consecutive laparoscopic operations. . 2011. 66(3):417-420
9. Mahdi BOUASSIDA, Obeid BELGHITH, Slim ZRIBI, Mohamed Fadhel. Predictive factors of conversion during cholecystectomy for acute Lithiasis acute cholecystitis. *Journal of Surgery*, October 2015. A9-A36 Vol. 152 - Special Issue 3.
10. Andrew J. Shapiro, MD, Corey Costello, MD. Predicting conversion to laparoscopic cholecystectomy in acute cholecystitis. *Conversion of Laparoscopic Cholecystectomy for Acute Cholecystitis*. *JLS* (1999)3:127-130.
11. N. A. Kama, M. Doganay, M. Dolapci, E. Reis, M. Atli, M. Kologlu. Risk factors Risk factors resulting in conversion of laparoscopic cholecystectomy to open surgery. *SurgEndosc* (2001) 15:965-968.
12. Kama NA, Doganay M, Dolapci M, Reis E, Atli M, Kologlu M. Risk factors resulting in conversion of laparoscopic cholecystectomy to open surgery. *Surgical endoscopy*. 2001;15(9):965-8.
13. SIFEDDINE ALKANDRY, A.ZENTAR, A.BOUNAIM, ASMAE MSELLAK. Sub-laparoscopic cholecystectomy: experience at the IBN Alkhatib Hospital (141 cases), thesis for the doctorate in medicine. Faculty of Medicine of Rabat. thesis year 2010 number 80
14. OUSADDEN ABDELMALEK, Mr. AIT LAALIM SAID, Mr. IBN MAJDOUB HASSANI KARIM, BENJELLOUN EL BACHIR, HALIME YOUSSEF. LAPAROSCOPIC CHOLECYSTECTOMY
15. Narjiss, Youssef. Conversion to laparotomy in laparoscopic cholecystectomies. *laparoscopic cholecystectomies*. Marrakech: FMPM, 2017. thesis No. 111
16. Bouffetal, Rachid. Conversion rate in laparoscopic cholecystectomies.

laparoscopic cholecystectomies (About 10 cases). Casablanca: FMPC, 2020. thesis No. 312.

17. Wyroślak-Najs, Grzegorz C'wik - Tomasz Skoczylas -Justyna. The value of percutaneous ultrasound in predicting conversion from laparoscopic to open cholecystectomy due to acute cholecystitis. SurgEndosc, 2013. 27:2561-2568.

18. Muhammad Rafique Memon, Ghulam Muhammad, Saima Arshad, Ali

Gohar Bozdar, Syed Qarib Abbas Shah. STUDY OF OPEN CONVERSION IN LAPAROSCOPIC CHOLECYSTECTOMY

LAPAROSCOPIC CHOLECYSTECTOMY. Gomal Journal of Medical Sciences, January-June 2011. Vol. 9, No. 1.

19. Patrick Pessaux, Jean Jacque Tuech. Laparoscopic cholecystectomy in the treatment of acute cholecystitis, prospective non-randomized study.

Gastroenterol clin biol, 2000. 24: 400-403.

20. Ibrahim S, Hean TK, Ho LS, Ravintharan T, Chye TN, Chee CH. Risk factors for conversion to open surgery in patients undergoing laparoscopic cholecystectomy. World journal of surgery. 2006;30(9):1698-704.

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