



## Quality Improvement Study

## Asymptomatic abdominal wall and incisional hernias: Is therapeutic decision consensual? An international survey

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## ABSTRACT

**Introduction:** Hernia pathology is one of the leading causes of surgery worldwide. For asymptomatic patients, surgery remains questionable. The objective of this study was to evaluate the practices of a large population of digestive surgeons with asymptomatic hernia.

**Methods:** Between October 2016 and March 2017, French-speaking digestive surgeons were invited to respond to an online survey consisting of 13 common clinical situations concerning primary or asymptomatic incisional hernia pathology where a therapeutic decision was requested. A consensual attitude was defined by identical care by at least 75% of surgeons.

**Results:** Of the 204 surgeons responding to the study, 44% were under 45 years of age. The therapeutic attitude was consensual in 2 out of 13 clinical cases: surgical abstention was chosen consensually for inguinal hernia in the elderly with comorbidities while surgical treatment was consensually chosen for incisional hernia in a young patient in remission of pancreatic cancer. The under-45s were more likely to undergo surgical repair (5 cases of 13 vs 4 cases of 13,  $p = 0.03$ ).

**Conclusion:** Although frequent, the management of primary and incisional hernias of the abdominal wall does not reach consensus in the surgical community. Specific recommendations for indications of surgical management or watchful waiting are required.

## 1. Introduction

Present in nearly 30% of men and 3% of women, hernia pathology remains one of the first indications of surgery in France [1]. In case of surgery, the risk of short-term complications is moderate. Nevertheless, 10% of patients will develop chronic parietal pain that is sometimes disabling [2].

In case of strangulated hernia, the indication in urgency is indisputable. For patients with painful or embarrassing hernias, surgery, compared with watchful waiting, limits the occurrence of disabling pain and the development of bulky hernias that are difficult to reduce [3,4]. Finally, the management of a perfectly asymptomatic hernia and fortuitous discovery during a clinical examination remains debatable. Indeed, the risk of acute hernia complication is estimated at 2% after 10 years of follow-up [5] and therefore needs to be weighed against that of

an intervention. The predictive criteria for complications in case of surgical abstention are not established [6] and the current recommendations concerning the management of asymptomatic hernias remain unclear. In the absence of specific recommendations, the surgeon is led to choose between therapeutic abstention, watchful waiting or surgery.

The objective of this study was to evaluate practices in a large population of digestive surgeons with asymptomatic hernia.

## 2. Methods

Between October 2016 and March 2017, French speaking surgeons were invited to participate in an online survey.

The survey consisted of general questions about the surgeons' activity and then 13 clinical situations where a decision was requested (Tables 1–3). The clinical cases were developed by the authors of the

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**Table 1**  
Questionnaire on asymptomatic hernias in the groin area.

Case 1: A 35-year-old patient with no previous antecedent, consulting for a troublesome inguinal hernia. You see on examination a hernia on the symptomatic side and a hint of contralateral hernia. What do you propose for asymptomatic hernia?

. I do not retain any indication for operation or watchful waiting	18,4%	Abstention: 5,6%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	14,3%	Surgery: 62%
. I propose an annual watchful waiting and I operate in case of aggravation	1,5%	
. I propose an open repair without prosthetic mesh	12,8%	
. I propose an open repair with prosthetic mesh	47,4%	
. I propose a laparoscopic repair		

Case 2: Institutionalized 90-year-old patient with Alzheimer's dementia under aspirin for primary prevention referred for the discovery of femoral hernia during a hospitalization for acute pyelonephritis. What do you propose?

. I do not retain any indication for operation or watchful waiting	52%	Abstention: 14,3%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	2,6%	Surgery: 62%
. I propose an annual watchful waiting and I operate in case of aggravation	10,7%	
. I propose an open repair without prosthetic mesh	13,3%	
. I propose an open repair with prosthetic mesh	7,1%	
. I propose a laparoscopic repair		

Case 3: A 78-year-old patient with severe vascular comorbidities (ischemic stroke with hemiplegia and sequela aphasia, right femoral stent), referred for the discovery of an asymptomatic left inguinal hernia, during a routine clinical examination by his attending physician. You confirm the diagnosis of a small direct inguinal hernia, uncomplicated. What do you propose?

. I do not retain any indication for operation or watchful waiting	48,5%	Abstention: 20,9%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	13,3%	Surgery: 31%
. I propose an annual watchful waiting and I operate in case of aggravation	0,5%	
. I propose an open repair without prosthetic mesh	13,3%	
. I propose an open repair with prosthetic mesh	3,6%	
. I propose a laparoscopic repair		

Case 4: A 55-year-old patient with no major medical-surgical history, referred for the discovery of a small asymptomatic inguinal hernia during a urologist's assessment of benign prostatic hyperplasia. Prostate adenoma has been medically treated for 3 months with good efficacy. You confirm the presence of a small inguinal hernia. What do you propose for asymptomatic hernia?

. I do not retain any indication for operation or watchful waiting	18,4%	Abstention: 16,3%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	21,9%	Surgery: 17%
. I propose an annual watchful waiting and I operate in case of aggravation	1%	
. I propose an open repair without prosthetic mesh	22,4%	
. I propose an open repair with prosthetic mesh	19,9%	
. I propose a laparoscopic repair		

Case 5: A 70-year-old patient, without major medical-surgical history, consulting for second opinion. An asymptomatic inguinal hernia was diagnosed 5 years ago during a routine clinical examination. The surgical indication was not retained by the surgeon seen in consultation at the time. The patient is always asymptomatic. You will find in the clinical examination a small inguinal hernia. What do you propose?

. I do not retain any indication for operation or watchful waiting	41,3%	Abstention: 5,6%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	26,5%	Surgery: 43%
. I propose an annual watchful waiting and I operate in case of aggravation	0,5%	
. I propose an open repair without prosthetic mesh	13,8%	
. I propose an open repair with prosthetic mesh	12,2%	
. I propose a laparoscopic repair		

Case 6: A 60-year-old woman with no major medical-surgical history who was referred for the accidental discovery of an inguinal hernia during a clinical examination by her attending physician. The diagnosis is confirmed by an abdominal ultrasound. You also find a hernia tip. What do you propose?

. I do not retain any indication for operation or watchful waiting	30,6%	Abstention: 9,2%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	24%	Surgery: 36%
. I propose an annual watchful waiting and I operate in	3,1%	

**Table 1 (continued)**

Case 1: A 35-year-old patient with no previous antecedent, consulting for a troublesome inguinal hernia. You see on examination a hernia on the symptomatic side and a hint of contralateral hernia. What do you propose for asymptomatic hernia?

case of aggravation	14,8%
. I propose an open repair without prosthetic mesh	18,4%
. I propose an open repair with prosthetic mesh	
. I propose a laparoscopic repair	

Case 7: A 50-year-old patient is referred to you for bilateral inguinal hernia. He had consulted his treating physician for an embarrassing right inguinal swelling. An ultrasound was performed, confirms the hernia on the right side, and also found a contralateral hernia. At the clinical examination, you find the hernia on the right side, but you do not perceive hernia on the left. What do you propose regarding asymptomatic hernia?

. I do not retain any indication for operation or watchful waiting	31,6%	Abstention: 5,1%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	13,8%	Surgery: 49%
. I propose an annual watchful waiting and I operate in case of aggravation	1%	
. I propose an open repair without prosthetic mesh	10,2%	
. I propose an open repair with prosthetic mesh	38,3%	
. I propose a laparoscopic repair		

study in order to solve the frequent problems with the treatment of hernias and incisional hernias:

- asymptomatic inguinal hernia: cases 1 to 7
- asymptomatic umbilical hernia: case 8 to 11
- asymptomatic incisional hernia: cases 12 and 13
- discovery of an asymptomatic hernia in a patient going to be operated from another hernia: case 1
- comorbidities at high risk of postoperative morbidity and mortality: cases 2 and 3
- abdominal hyperpressure factor: cases 4 and 11
- significant clinical decline: cases 5, 9 and 10
- paraclinical diagnosis of asymptomatic hernia: cases 6 and 7
- Umbilical hernia of the postpartum: cases 8 and 9
- Umbilical hernia of the cirrhotic: case 11
- neoplastic context: cases 12 and 13
- low life expectancy: cases 2, 3 and 13

For each clinical case, surgeons had to choose between surgery and abstention. In case of surgery, the surgeons could propose either a cure by open repair with or without prosthetic reinforcement, or a laparoscopic treatment. If abstention was chosen, surgeons had the choice between the absence, a semi-annual or an annual watchful waiting.

A consensus attitude was defined arbitrarily by the retention of an identical therapeutic attitude by more than 75% of the surgeons surveyed: surgical repair versus abstention. Expertise in parietal surgery was arbitrarily defined by performing more than 15 parietal repair procedures per month.

This work has been reported in line with the Standards for Quality Improvement Reporting Excellence (SQUIRE) criteria.

Quantitative data were expressed as median values (extreme values) and compared using a non-parametric Mann-Whitney test. Qualitative data were expressed in numbers and percentages, the latter being calculated on all completed responses collected by question after exclusions from missing data. Qualitative data were compared using the Pearson Chi-2 test or Fisher's exact test, based on the numbers expected in the contingency tables.

### 3. Results

#### 3.1. Surveyed population

Two hundred and four French-speaking digestive surgeons responded to the study. Among them, 202 practiced in France and 2 in

**Table 2**  
Questionnaire on asymptomatic umbilical hernias.

Case 8: A 28-year-old patient, at 3 months postpartum, consults for a small umbilical hernia that appeared during pregnancy, but asymptomatic. On examination, there is a small swelling in the umbilicus, the collar is infracentimetric. The contents of the hernia is the size of a cherry kernel. What do you propose?

. I do not retain any indication for operation or watchful waiting	32,8%	Abstention: 19,6%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	21,2%	Surgery: 26%
. I propose an annual watchful waiting and I operate in case of aggravation	18,5%	
. I propose an open repair without prosthetic mesh	6,9%	
. I propose an open repair with prosthetic mesh	1,1%	
. I propose a laparoscopic repair		

Case 9: At 2 years of pregnancy, the same patient (who has not been operated), consults again on the advice of his doctor, for the same problem. There is no discomfort or complication on this hernia. The clinical examination is comparable to that performed 2 years ago. What do you propose?

. I do not retain any indication for operation or watchful waiting	44,4%	Abstention: 5,8%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	18,5%	Surgery: 31%
. I propose an annual watchful waiting and I operate in case of aggravation	19,6%	
. I propose an open repair without prosthetic mesh	7,9%	
. I propose an open repair with prosthetic mesh	3,7%	
. I propose a laparoscopic repair		

Case 10: A 35-year-old patient with a small, asymptomatic umbilical swelling since adolescence. The clinical examination reveals a small hernia of an infracentimetric collar and very low volume contents. What do you propose?

. I do not retain any indication for operation or watchful waiting	50,3%	Abstention: 4,2%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	18,5%	Surgery: 27%
. I propose an annual watchful waiting and I operate in case of aggravation	15,9%	
. I propose an open repair without prosthetic mesh	8,5%	
. I propose an open repair with prosthetic mesh	2,6%	
. I propose a laparoscopic repair		

Case 11: 45-year-old patient, followed in hepatology for cirrhosis of ethyl origin revealed 1 year earlier by an inaugural oedemato-ascitic decompensation. Cirrhosis is currently well compensated (Child-Pugh A) since ethyl weaning. There are no plans for immediate liver transplantation in the absence of evidence of portal hypertension or hepatocellular insufficiency since weaning. He presents a paucisymptomatic umbilical hernia, supracentimetric collar, well reducible. What do you propose?

. I do not retain any indication for operation or watchful waiting	12,7%	Abstention: 19,6%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	9,5%	Surgery: 42%
. I propose an annual watchful waiting and I operate in case of aggravation	19%	
. I propose an open repair without prosthetic mesh	29,6%	
. I propose an open repair with prosthetic mesh	9,5%	
. I propose a laparoscopic repair		

Switzerland. Forty-six surgeons were under 35 (22.5%), 42 between 35 and 44 (20.6%), 49 between 45 and 54 (24%), and 67 were 55 or older (32.8%). Eighty-four surgeons practiced in University Hospital Center (41.2%), 44 in General Hospital (21.6%), 8 in Center participating in the public service (3.9%), 69 in private clinics (33.8%), and 6 in other structures (2.9%). A parietal repair was performed less than 5 times per month by 42 surgeons (20.6%), from 5 to 14 times per month by 123 surgeons (60.3%), and more than 15 times per month by 39 surgeons (19,1%).

The responses to the “inguinal hernia”, “umbilical hernia” and “incisional hernia” questionnaires are summarized in Tables 1–3 of Appendix. A consensual attitude was found only in cases 3 (asymptomatic inguinal hernia in an elderly patient with heavy comorbidities, in favor of surgical abstention) and 13 (asymptomatic hernia in a young patient in remission of pancreatic cancer, in favor surgery). A surgical indication was mainly retained in cases 1 (asymptomatic contralateral inguinal hernia of a symptomatic hernia), 2 (asymptomatic femoral

**Table 3**  
Questionnaire on asymptomatic incisional hernias.

Case 12: 70-year-old overweight patient consulting for annual follow-up of left colon cancer operated by laparotomy a year ago. The pathology revealed an adenocarcinoma pT3N0M0R0. The patient is in good shape, and does not describe any abdominal complaints. At the clinical examination, you find a small uncomplicated incisional hernia in front of the umbilicus, confirmed on the scanner requested in the oncological surveillance. What do you propose?

. I do not retain any indication for operation or watchful waiting	13,2%	Abstention: 27,5%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	22,8%	Surgery: 63%
. I propose an annual watchful waiting and I operate in case of aggravation	3,7%	
. I propose an open repair without prosthetic mesh	24,9%	
. I propose an open repair with prosthetic mesh	7,9%	
. I propose a laparoscopic repair		

Case 13: 45-year-old patient, very active, consulting for a small incisional hernia on a bilateral subcostal laparotomy scar. The incisional hernia is located next to the midline, the collar is small, supracentimetric, and the patient does not describe pain or incarceration episode. The patient is asking for a repair because of the aesthetic discomfort. It should be noted that laparotomy was performed 2 years ago for cephalic duodenopancreatectomy for cancer. The patient is currently in remission.

. I do not retain any indication for operation or watchful waiting	2,6%	Abstention: 13,2%
. I propose a half-yearly watchful waiting and I operate in case of aggravation	7,4%	Surgery: 23%
. I propose an annual watchful waiting and I operate in case of aggravation	8,5%	
. I propose an open repair without prosthetic mesh	57,7%	
. I propose an open repair with prosthetic mesh	10,6%	
. I propose a laparoscopic repair		

hernia), and 11 (asymptomatic umbilical hernia in a well-compensated cirrhotic patient). Watchful waiting was offered in 29% of situations. The cases where watchful waiting was most frequently proposed were case 12 (incisional hernia one year after colectomy for cancer: 50%) and case 4 (asymptomatic inguinal hernia following the discovery of a prostatic adenoma: 38%).

Surgeons younger than 45 years of age were more likely to perform surgical repair than surgeons over 45 years of age (5 cases out of 13 vs. 4 out of 13,  $p = 0.03$ ) (Table 4 in the Appendix). The surgical proposal was particularly common among surgeons younger than 45 years in cases 8 (postpartum asymptomatic umbilical hernia: 21 (35.6%) vs 29 (19.6%),  $p = 0.002$ ), 12 (asymptomatic incisional hernia one year after colectomy for cancer: 40 (48.8%) vs 29 (27.1%),  $p = 0.002$ ) and 13 (asymptomatic incisional hernia in a young patient in remission of pancreatic cancer: 70 (85.4%) vs 75 (70.1%),  $p = 0.015$ ). In all cases, age did not influence the laparoscopic proposal except for cases 9 (asymptomatic umbilical hernia at 2 years postpartum: 1 (3.1%) vs 6 (22.2%),  $p = 0.04$ ) and 11 (asymptomatic umbilical hernia in a well-compensated cirrhotic patient: 3 (6.4%) vs 15 (23.8%),  $p = 0.018$ ) where the difference was significant in favor of the more than 45 years. The age of the surgeon did not influence the decision to provide watchful waiting on all clinical cases except for the 12th case (incisional hernia one year after colectomy for cancer): 65 (60.7%) vs 30 (36.6%),  $p = 0.001$ ) where surgeons over 45 years of age offered more watchful waiting.

Public or liberal activity did not influence the management of all 13

**Table 4**  
Age-related responses to the therapeutic proposal for asymptomatic hernia or incisional hernia.

Age of the surgeon	>45 years	<45 years	p
n	117	87	–
Surgery proposal (out of 13 clinical cases)	4 (2–7)	5 (3–7)	0,030
Laparoscopic repair proposal (out of 13 clinical cases)	1 (0–3)	1 (0–3)	0,665
Watchful waiting proposal (out of 13 clinical cases)	3 (1–6)	3 (1–5)	0,145

clinical situations except for cases 8 (postpartum asymptomatic umbilical hernia: 12 (17.1%) vs 38 (31.9%),  $p = 0.028$ ) and 9 (asymptomatic umbilical hernia at 2 years postpartum: 13 (18.6%) vs 46 (38.7%),  $p = 0.005$ ), where the liberal surgeons offered significantly less surgical repair (Table 5 of the annex).

The expertise in parietal surgery (Table 6 of the appendix) did not influence the management of all 13 clinical cases except in cases 9 (asymptomatic umbilical hernia at 2 years postpartum: 5 (14, 3%) vs 54 (35.1%),  $p = 0.016$ ), 10 (asymptomatic umbilical hernia evolving for 20 years: 4 (11.4%) vs 47 (30.5%),  $p = 0.021$ ), and 13 (Asymptomatic incisional hernia in a young patient with a remission pancreatic cancer: 22 (62.9%) vs. 123 (79.9%),  $p = 0.045$ ), where expert surgeons less often offered surgical repair. Expert surgeons more often proposed laparoscopy in cases 10 (asymptomatic umbilical hernia evolving for 20 years: 2 (50%) vs 3 (6.4%),  $p = 0.043$ ) and 11 (asymptomatic umbilical hernia in a well-compensated cirrhotic patient): 8 (42.1%) vs 10 (11%),  $p = 0.03$ ).

#### 4. Discussion

The hernia cure remains one of the surgeries most practiced in the world with 20 million acts performed annually [7]. It therefore seems important, both in terms of the management of patients, and the economic cost represented, that the surgical indication is consensual and rational. However, this study has revealed a great heterogeneity in the potential management of abdominal wall pathology. Indeed, a consensual attitude (>75% agreement) was only found in 15.4% of the proposed situations (2 cases out of 13): 1-in an elderly patient with heavy comorbidities presenting with an asymptomatic inguinal hernia, the consensus was in favor of surgical abstention and 2-in a young patient in a remission pancreatic cancer with asymptomatic incisional hernia, the consensus was in favor of surgery. Moreover, the majority of surgeons questioned retained a surgical indication in 23% of cases (3 of 13): 1-for a patient with contralateral asymptomatic inguinal hernia of operated symptomatic hernia, 2-in a woman with asymptomatic femoral hernia and 3-for a well-compensated cirrhotic patient with asymptomatic umbilical hernia.

The objective of hernia surgery is twofold: to eradicate pain associated with symptomatic hernia and to limit the risk of hernia strangulation. Regarding pain, a frequent reason for consultation, it alone justifies the intervention. However, chronic pain after hernia repair is common. This risk may affect 63% of patients after simple remission at one year [8]. The use of tension-free prosthetic mesh decreases chronic pain rates by between 13% and 37% in the case of direct approach surgery [2]. Similarly, laparoscopic surgery seems to reduce this complication [2]. In a randomized trial involving 1370 patients, 9% of patients had chronic pain at 5 years after laparoscopy and 19% after Lichtenstein repair [9]. In another study, at 1 year, 25% of patients had chronic pain after PET vs. 29% after Lichtenstein [10]. These results are to be weighted with the recent results of a large US registry study finding less resting pain after PET vs. Lichtenstein (4.3 vs 5.2%,  $p = 0.03$ ) and exercise (7.7 vs 10.6%,  $p < 0.001$ ) [11]. While the recurrence rate of umbilical hernias is lower in prosthetic mesh repair compared to simple suture, morbidity is similar in a recently published randomized-trial meta-analysis [12].

**Table 5**

Responses according to the type of activity on the therapeutic proposal for asymptomatic hernia or incisional hernia.

Type of activity	public	libéral	p
n	127	77	–
Surgery proposal (out of 13 clinical cases)	5 (3–7)	4 (3–7)	0,326
Laparoscopic repair proposal (out of 13 clinical cases)	1 (0–2)	2 (0–4)	0,065
Watchful waiting proposal (out of 13 clinical cases)	3 (1–6)	3 (1–6)	0,991

**Table 6**

Influence of the degree of expertise on the therapeutic proposal for asymptomatic hernia or incisional hernia.

Procedures per month	<15	>15	p
n	167	37	–
Surgery proposal (out of 13 clinical cases)	5 (3–7)	4 (2–7)	0,467
Laparoscopic repair proposal (out of 13 clinical cases)	1 (0–2)	2 (0–4)	0,060
Watchful waiting proposal (out of 13 clinical cases)	3 (1–6)	3 (1–6)	0,551

In view of this high risk of chronic pain, the systematic implementation of an elective repair in an asymptomatic patient appears very questionable. Two randomized trials go in this direction with no significant difference in pain at 6 months, 1 year and 2 years between watchful waiting and elective repair [13,14]. Concerning the risk of strangulation, it remains limited, and is estimated at 7% on average (2.4%–18%) if we use an indirect parameter consisting in dividing the number of patients operated on emergency on the number of patients operated on electively [15–18]. But, this risk seems much lower, of the order of 4 patients per 1000 per year according to a study of civilian samples over 5 years [19]. However, herniary strangulation has been shown to increase morbidity and mortality in emergency patients. In this population, morbidity and mortality average are 32% and 6%, respectively [16–18,20] [15–17,19]. Nevertheless, this risk of strangulation is probably counterbalanced by the considerable morbidity of elective surgery estimated between 5% and 38% [21–23], implying an important public health cost. Regarding asymptomatic hernias, intervention or watchful waiting decision should be based on the evaluation of the long-term complications risks in case of abstention compared to surgery which would make ones choose watchful waiting instead if they are high [24].

There are situations, excluding symptomatic hernia, where the surgical management is consensual. Among hernias in the groin area, femoral hernias affect females more frequently [15]. In a woman, any inguinal hernia should be considered as a femoral hernia because of the preoperative difficulty in distinguishing it from inguinal hernias and their high incidence in women [25]. However, 30–50% of the femoral hernias are discovered at the stage of herniary strangulation then requiring emergency intervention [16,18,20,26,27] increasing the risk of mortality. In our study, 62% of surgeons offered an elective repair in an elderly woman with dementia. The consensus threshold of 75% was however not achieved but related to the patient's debilitated terrain. Other factors for strangulation justifying elective repair are age over 60 years [28], time (cumulative probability) [18], a recent beginning of signs. Indeed, in a study, two-thirds of patients undergoing emergency surgery had hernia for less than a year and 60% electively operated had a hernia for more than one year [20]. In our study, an expected surgical attitude was not consensually or mostly chosen in several situations. Indeed, although it is justifiable from an anesthetic point of view to not propose surgery in an elderly patient with significant co-morbidities (case 3), elective repair should be proposed in free antecedent patients [28] as in case 5. Nilsson et al. have shown a high risk of mortality in emergency surgery in patients over 49 years of age with an ASA score greater than 2 [29]. Age, femoral hernia, and ASA score should therefore be considered in the surgical decision. At the opposite, the lack of selective criteria for watchful waiting results in a disparity of decision-making in the surgical community. Indeed, in our study, watchful waiting was proposed in only 29% of situations. In no clinical situation, more than 50% of surgeons offered watchful waiting. Likewise, there was a disparity in watchful waiting modalities between annual or semiannual follow-up. Thus, randomized controlled trials between surgery and watchful waiting with a follow-up of several years seem necessary in order to refine these selection criteria and also to assess the economic impact of these two attitudes. Our study has some limits. This is a study whose target population was Francophone

surgeons belonging to the French Society of Surgery and/or the Society of Surgery of Lyon and among all of its members, only 204 fully responded to this. In addition, the answers do not reflect the clinical practice but the theoretical indication that would be retained. However, the interest of this type of study is important because it allows to confirm the disparities of management, justifying the realization of new randomized controlled trials to offer a more consensual care of patients.

## 5. Conclusion

The choice between elective repair and watchful waiting for patients with asymptomatic hernia or incisional hernia does not reach consensus in the surgical community. The relationship between the benefit of elective repair to prevent a possible hernia complication and the risk of chronic surgical complications, makes the surgical decision debatable. Prospective randomized trials are therefore needed to establish specific recommendations.

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## Ethical approval

The data processing and its purpose were registered with the CNIL correspondent of Hospices Civils de Lyon (N° 20-146).

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## Author contributions

Romain JAQUET achieved the conception of the study, the bibliography and the principle writing.

Benjamin DARNIS achieved the study design and collected the data.

Pierre-Emmanuel BONNOT participated in the internal reviewing.

Kayvan MOHKAM provided data analysis and achieved the statistics.

Guillaume PASSOT participated to elaborate the conception of the study and internal reviewing.

Hospices civils de Lyon and French Association of Surgery participated as contributors helping to provide the surgeon participants to the study.

## Guarantor

Doctor Romain JAQUET and Professor Guillaume PASSOT are the guarantor of this work.

## Declaration of competing interest

The authors declare that they have no conflict of interest.

## References

- [1] R.J. Fitzgibbons, R.A. Forse, Clinical practice. Groin hernias in adults, *N. Engl. J. Med.* 372 (2015) 756–763, <https://doi.org/10.1056/NEJMc1404068>.
- [2] D. Wright, C. Paterson, N. Scott, A. Hair, P.J. O'Dwyer, Five-year follow-up of patients undergoing laparoscopic or open groin hernia repair: a randomized controlled trial, *Ann. Surg.* 235 (2002) 333–337.
- [3] L. Chung, J. Norrie, P.J. O'Dwyer, Long-term follow-up of patients with a painless inguinal hernia from a randomized clinical trial, *Br. J. Surg.* 98 (2011) 596–599, <https://doi.org/10.1002/bjs.7355>.
- [4] R.J. Fitzgibbons, B. Ramanan, S. Arya, S.A. Turner, X. Li, J.O. Gibbs, et al., Long-term results of a randomized controlled trial of a nonoperative strategy (watchful waiting) for men with minimally symptomatic inguinal hernias, *Ann. Surg.* 258 (2013) 508–515, <https://doi.org/10.1097/SLA.0b013e3182a19725>.
- [5] B. de Goede, A.R. Wijsmuller, G.H. van Ramshorst, B.J. van Kempen, W.C.J. Hop, P.J. Klitsie, et al., Watchful waiting versus surgery of mildly symptomatic or asymptomatic inguinal hernia in men aged 50 Years and older: a randomized controlled trial, *Ann. Surg.* 267 (2018) 42–49, <https://doi.org/10.1097/SLA.0000000000002243>.
- [6] HerniaSurge Group, International guidelines for groin hernia management, *Hernia* 22 (2018) 1–165, <https://doi.org/10.1007/s10029-017-1668-x>.
- [7] I.M. Rutkow, Demographic and socioeconomic aspects of hernia repair in the United States in 2003, *Surg. Clin. North Am.* 83 (2003) 1045, [https://doi.org/10.1016/S0039-6109\(03\)00132-4](https://doi.org/10.1016/S0039-6109(03)00132-4), 51–v-vi.
- [8] J. Cunningham, W.J. Temple, P. Mitchell, J.A. Nixon, R.M. Preshaw, N.A. Hagen, Cooperative hernia study. Pain in the postrepair patient, *Ann. Surg.* 224 (1996) 598–602.
- [9] A. Eklund, A. Montgomery, L. Bergkvist, C. Rudberg, Swedish Multicentre Trial of Inguinal Hernia Repair by Laparoscopy (SMIL) study group, Chronic pain 5 years after randomized comparison of laparoscopic and Lichtenstein inguinal hernia repair, *Br. J. Surg.* 97 (2010) 600–608, <https://doi.org/10.1002/bjs.6904>.
- [10] H.R. Langeveld, M. van't Riet, W.F. Weidema, L.P.S. Stassen, E.W. Steyerberg, J. Lange, et al., Total extraperitoneal inguinal hernia repair compared with Lichtenstein (the LEVEL-Trial): a randomized controlled trial, *Ann. Surg.* 251 (2010) 819–824, <https://doi.org/10.1097/SLA.0b013e3181d96c32>.
- [11] F. Köckerling, R. Bittner, M. Kofler, F. Mayer, D. Adolf, A. Kuthe, et al., Lichtenstein versus total extraperitoneal patch plasty versus transabdominal patch plasty technique for primary unilateral inguinal hernia repair: a registry-based, propensity score-matched comparison of 57,906 patients, *Ann. Surg.* 269 (2019) 351–357, <https://doi.org/10.1097/SLA.0000000000002541>.
- [12] D. Shrestha, A. Shrestha, B. Shrestha, Open mesh versus suture repair of umbilical hernia: meta-analysis of randomized controlled trials, *Int. J. Surg.* 62 (2019) 62–66, <https://doi.org/10.1016/j.ijssu.2018.12.015>.
- [13] R.J. Fitzgibbons, A. Giobbie-Hurder, J.O. Gibbs, D.D. Dunlop, D.J. Reda, M. McCarthy, et al., Watchful waiting vs repair of inguinal hernia in minimally symptomatic men: a randomized clinical trial, *Jama* 295 (2006) 285–292, <https://doi.org/10.1001/jama.295.3.285>.
- [14] P.J. O'Dwyer, J. Norrie, A. Alani, A. Walker, F. Duffy, P. Horgan, Observation or operation for patients with an asymptomatic inguinal hernia: a randomized clinical trial, *Ann. Surg.* 244 (2006) 167–173, <https://doi.org/10.1097/01.sla.0000217637.69699.ef>.
- [15] L.T. Palumbo, W.S. Sharpe, Primary inguinal hernioplasty in the adult, *Surg. Clin. North Am.* 51 (1971) 1293–1307.
- [16] S.N. Oishi, C.P. Page, W.H. Schwesinger, Complicated presentations of groin hernias, *Am. J. Surg.* 162 (1991) 568–570, discussion 571.
- [17] P. Primates, M.J. Goldacre, Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality, *Int. J. Epidemiol.* 25 (1996) 835–839.
- [18] N.C. Gallegos, J. Dawson, M. Jarvis, M. Hobsley, Risk of strangulation in groin hernias, *Br. J. Surg.* 78 (1991) 1171–1173.
- [19] R. Neutra, A. Velez, R. Ferrada, R. Galan, Risk of incarceration of inguinal hernia in Cell Colombia, *J. Chron. Dis.* 34 (1981) 561–564.
- [20] S. Rai, S.S. Chandra, S.R. Smile, A study of the risk of strangulation and obstruction in groin hernias, *Aust. N. Z. J. Surg.* 68 (1998) 650–654.
- [21] B. van den Heuvel, B.J. Dwaars, D.R. Klassen, H.J. Bonjer, Is surgical repair of an asymptomatic groin hernia appropriate? A review, *Hernia* 15 (2011) 251–259, <https://doi.org/10.1007/s10029-011-0796-y>.
- [22] I.L. Lichtenstein, Herniorrhaphy. A personal experience with 6,321 cases, *Am. J. Surg.* 153 (1987) 553–559.
- [23] J.L. Ponka, B.E. Brush, Experiences with the repair of groin hernia in 200 patients aged 70 or older, *J. Am. Geriatr. Soc.* 22 (1974) 18–24.
- [24] L.L. Wolf, J.I. Ejiogor, Y. Wang, M.G. Hunink, E. Losina, A.H. Haider, et al., Management of reducible ventral hernias, *Ann. Surg.* 269 (2019) 358–366, <https://doi.org/10.1097/SLA.0000000000002507>.
- [25] L. Schmidt, J. Rosenberg, [Women with groin hernias should be referred to surgery], *Ugeskr Laeger* 180 (2018).
- [26] A. McIntosh, A. Hutchinson, A. Roberts, H. Withers, Evidence-based management of groin hernia in primary care—a systematic review, *Fam. Pract.* 17 (2000) 442–447.
- [27] J.A. Alvarez, R.F. Baldonado, I.G. Bear, J.A.S. Solís, P. Alvarez, J.I. Jorge, Incarcerated groin hernias in adults: presentation and outcome, *Hernia* 8 (2004) 121–126, <https://doi.org/10.1007/s10029-003-0186-1>.
- [28] K. Brasso, K. Løndal Nielsen, J. Christiansen, Long-term results of surgery for incarcerated groin hernia, *Acta Chir. Scand.* 155 (1989) 583–585.
- [29] H. Nilsson, G. Stylianidis, M. Haapamäki, E. Nilsson, P. Nordin, Mortality after groin hernia surgery, *Ann. Surg.* 245 (2007) 656–660, <https://doi.org/10.1097/01.sla.0000251364.32698.4b>.