

Narrative Review

The Impact of Incisional Hernia Repair on the Quality of Life: A Narrative Review

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Abstract

Background: Incisional hernias represent a common complication following a midline incision, generating impairment, lower quality of life, and social costs. The aim of this narrative review is to determine in which manner risk factors – such as age, gender, postoperative complications, and even the overall health system – impact the satisfaction and expectations of the patients.

Methods: A literature search was performed through PubMed, Web of Science, and SpringerLink, addressing both international and national articles. Only full-text articles published in the last 12 years were chosen. Each individual positive or negative factor was then targeted.

Results: Statistically, the majority of patients were satisfied with the outcomes of the reparative surgery. Even so, complications can still occur, which are more likely to appear in the early postoperative stages. In most of these cases, the patients complained of strenuous movement, chronic pain, or recurrence, leaving the option of another surgical repair up to the patient's wishes. On the one hand it seems that robotic-assisted surgery (RAS), absorbable sutures, suture fixation without tacks, and the male gender were associated with a better quality of life and less recurrence or other complications. On the other hand, lack of communication between patients and health personnel, chronic health diseases, and the female gender were linked to a tendency of developing more complications and therefore, a lower quality of life.

Conclusion: Statistically, in most of the cases, the patients were satisfied with the results. While it is safe to say that an incisional hernia repair increases the quality of life, there is still a small, but significant percentage of people that do not benefit from it as much as they expected. More awareness should be raised and the communication between patients and health personnel improved.

Keywords: incisional hernia, postoperative hernia, incisional hernia repair, quality of life

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1. Introduction

Abdominal hernias can be primary or acquired: while the former group refers to primary ventral hernias (midline as epigastric and umbilical, and lateral as Spigelian and lumbar), the latter consists of incisional hernias, which are acquired forms on previous incisions. Reparative techniques are performed with prosthetic (alloplastic) materials that can be synthetic (polypropylene, polyester, PTFE- and composite) or biological (porcine dermis, bovine pericardium) [1].

The symptomatology of an IH is quite diverse, depending on its characteristics, however, most studies are pointing toward pain, discomfort, and altered emotional health, most probably due to a low self-perceived body image and lack of ease in performing daily duties. Other elements could be insomnia, dyspnea, constipation, diarrhea, fatigue, and more. Individuals with a BMI > 25 kg/m² or a subsequent pregnancy are prone to developing IH [2], whereas young patients and those that suffer from recurrences and smokers are prone to chronic pain [3, 4].

It is estimated that 13% and 22% of patients will develop an incisional hernia in the next two and three years following a midline incision, respectively, therefore leading to considerable social costs and impairment. While not every hernia is symptomatic, in 80% of cases it will require surgical repair [5, 6].

The quality of life after incisional hernia repair is yet to be thoroughly documented. So far, most studies have focused on the cost-effectiveness of the surgical technique, duration of surgery, or even the time span needed for a surgeon to master that certain technique. In the last few years, a number of studies have been conducted, focusing on the QoL or short- /long-term complications. Whilst this brings new horizons for this particular topic, there has not been a standardized protocol, leading to research that uses different types of criteria to define their patient population or assess the QoL. Therefore, when it comes to evaluating a greater mass of results, these might not be conclusive, needing to approach this subject in a fragmented way.

The aim of this narrative review is to provide the latest information concerning the quality of life in patients that underwent an incisional hernia repair surgery.

2. Materials and Methods

A thorough search through PubMed, Web of Science, and SpringerLink was performed, using the following search formula: (([Incisional OR ventral OR postoperative] AND hernia] AND [quality of life]). We included cross-sectional, retrospective, and prospective

cohorts, and controlled trials published in the last 13 years in order to choose the most relevant and recent data. The studies must assess the quality of life among different groups of patients in order to achieve a broad image over the subject.

To be included, the studies have to focus on differences between the given cohorts, which are grouped into general aspects, such as age, gender, health status, and more topic-related aspects – classic, laparoscopic, or (RAS), type of mesh used, onlay or sublay placement of the mesh, symptoms accused preoperatively by the patients, and expectations prior to the surgery. In addition, the outcomes relevant to the quality of life are to be observed, that being convalescence period, performance reported by the patient for daily and more strenuous activities, and acute and chronic reported complications. For the acute complications, we decided to focus on acute postoperative pain, mesh-associated infections, mesh removal, ileus, seroma formation, enterocutaneous fistula, recurrence up to the first 30 postoperative days, hemorrhage and sepsis, and for the chronic complications we chose chronic postoperative pain, recurrence following 30 postoperative days, late enterocutaneous fistula and mesh-associated complications, such as mesh migration, mesh shrinkage, intraperitoneal adhesions that can predispose to small bowel obstruction, and inflammatory local reactions that can develop into fibrosis.

Moreover, risk factors for each of these complications were observed – age, gender, physical health status, BMI, smoking, stress, emotional health.

Typical QoL assessment questionnaires, such as CCS, SF-36, HerQLes (Hernia-related quality-of-life assessment) tool, Gillman pain test and VAS (visual analogue scale) were searched for. In addition, to broaden the range of the data that was included, personalized surveys created by the surgeons for those particular studies were added as long as they were targeting our previously mentioned long-term and short-term outcomes.

Lastly, a total of 25 articles were selected.

3. Results & Discussion

Typical QoL assessment questionnaires are the CCS, SF-36, HerQLes – Hernia-related quality-of-life assessment tool, Gillman pain test, and specific personalized surveys created by the surgeons conducting the study.

The CCS (Carolina Comfort Scale) is a validated hernia specific survey that uses a 0–5 scale to evaluate the pain, mesh sensation, and mobility of the patient after the

surgery [7]. It is one of the most commonly used scores. The higher the score, the lower is the health-related QoL, ranging between 0 and 115.

The SF-36 (short form - 36) is another survey, quite often used for many other health conditions, but mostly used in the US to assess patients after an incisional hernia repair. It is based on 36 graded questions that define eight other domains: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). Each of these subscales can receive a score between 0 (poor health) and 8 (good health), based on their own set of questions, therefore resulting in two major subscales: physical health and mental health. A study can choose to focus on certain scales or use them all in an integrated manner [7].

The Karnofsky Performance Status Scale (KPS) is used to measure functional performance by assessing the patient and giving a score in the form of increments between 100 (perfect health condition, the patient can perform multiple activities, without the aid of other people) and 0 (death) [8].

The HerQLes – Hernia-related quality-of-life assessment tool – is a 12-phrase survey in which the patient has to pick an answer that ranges between “strongly disagree” and “strongly agree.” The higher the score, the more the patient’s QoL affected [1].

The McGill pain score is also worth mentioning. It is administered by an interviewer and for each subclass of words, the patient has to choose one word that describes the pain in the best way, each word having an already established value. In the end, the value of these words is summed up and a score between 0 and 78 is the final result. The higher the score is, the greater the pain [9].

Supposedly, an IHR should bring the functionality of the abdominal wall to levels similar to the general population after one year postoperatively, but never as good as theirs, as another study shows [10].

3.1. Laparoscopic vs open vs robotic-assisted surgery

It is widely accepted that an open repair technique poses more threats than a minimally invasive one, such as greater risk of infection, longer hospitalization time, and harder postoperative recovery. Even so, in the case of larger, more complex hernias it is recommended [11]. Certain surgical procedures can be done in an open or minimally invasive manner depending on the size of the hernia, the latter being the most preferred.

IPOM plus (and the classic IPOM) is one such technique. The IPOM-plus technique needs four ports, each being used for different purposes during the stages of the

surgery. Pneumoperitoneum is achieved using a Veress needle. After adhesiolysis, the hernia sac is excised and a composite mesh is used to close the intra-peritoneal defect. Five transfascial sutures are needed, one in the center, and four in the corners. Another option to better center the mesh is by having a central suture and four peripheral sutures in a cross shape. This technique seems to present the most benefits, as it has a lower postoperative recovery time and the seroma heals faster compared to the IPOM technique [12, 13]. In a study conducted by Saijo *et al.* [12], these two methods were compared. In total, 33 patients were included in this study – 14 undergoing IPOM and 19 undergoing IPOM plus. The QoL was assessed pre- and postoperatively using the SF-36. Seroma formation was associated more often with IPOM, whereas chronic pain was accused by the IPOM plus group. Regarding the SF-36 at one-year postoperatively, five out of eight subscales were improved in both groups (PF, RP, GH, SF, RE) and between the two groups, there were no statistically significant differences.

Another study is addressing the onlay placement of the mesh, observing patients after five years from an onlay IHR repair [14]. The results were quite satisfying, with only 24 patients (33%) accusing recurrences, and among them, only 8 out of the 24 patients refusing the surgery, because they were asymptomatic. As expected, patients suffering from recurrences had a lower QoL than the ones without.

As it was already mentioned, minimally invasive procedures are preferred by both patients and surgeons, however, in certain cases open IHR surgeries need to be performed. TAR is one sequence that is associated most of the time and Sadava *et al.* [15] conducted a study where they assessed the QoL at 60 days postoperatively. Only 4% had a recurrence and the overall 30-day morbidity was 24%, including surgical site infections, seromas, and one mesh removal. The HerQLes questionnaire results at six months postoperatively showed significant improvements, the mean preoperative cohort score being 50.9 ± 22.9 , whereas the postoperative cohort score was 91.8 ± 18.0 .

Another open surgery technique is the classic Chevrel technique, and even more importantly, the modified Chevrel technique presented in this particular study by Mommers *et al.* [16]. It was shown that a modified Chevrel technique is superior to the original one, leading to low recurrence rates and an optimized QoL. The process begins with antibiotic prophylaxis and an incision across the scar tissue. The layers above the anterior rectus abdominis fascia are dissected up until 2–3 cm lateral of the rectus muscle. An incision up to 5 cm is made across the fascia, depending on the size of the hernia. The medial part of the anterior fascia is then separated from the adjacent tissue and turned over the midline. The content of the sac is excised or left as it is. “Both the left and right ‘turned over’ anterior fascia can now be sutured in the midline with a

continuous 2/0 polydioxanone (PDS) suture using small bites. This suture 'closes' the abdomen and provides the first 'layer' of the repair." The second layer is a polypropylene mesh, sutured to the lateral side of the anterior fascia. "One tied suture fixes the mesh at the cranial and one at the caudal meeting point of the left and right lateral part of the anterior rectus fascia. With small bites, the mesh is sutured to the edge of the anterior fascia running from cranial and caudal, thereafter, meeting halfway where the cranial and caudal suture are tied together." The mesh has to be flat on the surface. "The excess mesh is trimmed with scissors to leave a rim of approximately 1.5 cm lateral to the continuous suture. This rim is then sutured to the ventral side of the anterior rectus fascia using single Prolene® 2/0 sutures." This technique has the original Chevrel one as its base but it "does not require such large subcutaneous dissection since the mesh is sutured to the remnant of the anterior rectus fascia with only one-and-a-half centimeters overlap." In this study, there were 155 patients included. Among these, only 110 presented themselves to the long-term follow-up and two patients had a recurrence after 13 and 15 months. This study also performed a literature review, concluding that in the modified Chevrel technique group the recurrence rate was between 0% and 2% and in the original group between 0% and 33%. In the first 30 postoperative days, 36 out of 155 patients had complications, but mostly seromas. After 35 months, the QoL was assessed via de CCS, and 60% reported a score of 0, meaning perfect health condition.

However, generally speaking, between the RAS, laparoscopic, and open surgery, RAS seems to offer the best results for the patient [17]. LeBlanc *et al.* showed in their study that the lowest complication rates were among the RAS group with a Clavien-Dindo grade I compared to grades II–III for the open technique. Patients could also return to work faster, and the highest painkillers prescription demand was in the open group, but even so, between patients that were taking analgesics, the dosage was similar. Regarding the HerQLes questionnaire, in the first three months postoperatively, there were no major differences recorded, but afterward the RAS group seemed to score higher than the open and laparoscopic groups. Preoperatively, the mean cohort score in the RAS group was 47.0 ± 26.0 and postoperatively the value was 71.7 ± 23.9 . For the open and laparoscopic groups, the preoperative values were 52.5 ± 27.6 and 46.8 ± 27.55 , respectively, and the postoperative mean cohort values were 70.0 ± 26.5 and 73.9 ± 22.0 , respectively. Therefore, it is safe to say that all three options brought a better QoL to the patients, however, RAS showed the best improvements. These results are slightly different than the findings from another study [18]. In this particular study, there is a comparison between the open and RAS groups at one year postoperative. In terms of age, BMI, and type of mesh or size, there are no statistically significant

differences. Although both groups showed an increase in the QoL, the open and RAS median scores at one year were 88 and 90, respectively, and the recurrence rates were 20% and 24%, respectively. In order to determine if these results are statistically significant, a multivariate analysis was performed, showing that no technique was superior over the other. Therefore, homogenous research should be done in order to reach a consensus.

3.2. Method of fixation

The placement of the mesh is not the only important variable, but the method of fixation as well. In an RCT study conducted by Eelco Wassenaar *et al.* [19], different methods of fixation techniques were evaluated to determine which one carries the best results. These are “absorbable sutures (AS) with tacks; double crown (DC), which involved two circles of tacks and no sutures; and nonabsorbable sutures (NS) with tacks” and a QoL survey both preoperatively and three months postoperatively. The end results determined that the postoperative pain in these three groups was similar, but slightly higher in the NS and DC groups, most probably due to a more secure fixation than needed. Regarding the QoL, the results were obtained after completing a preoperative and postoperative SF-36 survey and extracting the preoperative value from the postoperative value for each of the eight subscales of this form, therefore resulting in only one value. Between the AS, DC, and NS groups, AS registered better post-hoc analysis results in the role limitation due to physical problems (8.6 vs 10.8 vs 9.2) and physical function (13.5 vs 2.4 vs 9.2). Therefore, in all three groups, the QoL was improved at three months postoperatively, but statistically, there are no major differences between the three techniques, therefore none is superior over the other.

Contrarily, in another study, they compared suture fixation with or without tacks [20]. The cost of the procedure was higher in the tacker group. Postoperative recovery was faster in the suture group and the intensity of the pain was higher in the tacker group up until one month postoperatively. At the three-month follow-up, the intensity of the pain between the two groups was similar, decreasing for all but five patients. These were observed for the next two years, with four patients still complaining about surges of pain associated with sudden abdominal movement – two patients from the tacker group and two from the suture group. The QoL assessment via the SF-36 survey showed no major differences between the two groups, however, what is surprising is that the suture group showed no improvements in the physical function compared to the tacker group.

Overall, all patients had an improved QoL, both physically and emotionally. Regarding the patient satisfaction, the suture group recorded better results.

3.3. Types of mesh

The mesh used can also contribute to the overall results. A biological mesh has more benefits over other types, such as less chances of a postoperative infection, however, they are costly and when treating a larger or complex hernia the recurrence rate is higher than the other available choices. In a recent study [21], outcomes of long- (LTD) and mid-term degradable (MTD) meshes were analyzed. It was observed that in the group with MTD the patients had no need for removing the mesh in case it got contaminated, compared to the LTD meshes, where nine patients had it done. The recurrence rate was similar at the follow-up.

Similarly, in an observational study, the outcomes and QoL associated with the use of biosynthetic meshes were assessed [1]. Having a multitude of materials for a mesh gives surgeons the choice to decide the best option for them, but due to inconsistent data, the results are conflicting, therefore facing a great deal of subjectivity regarding this matter. In this study, 275 patients were included and observed for 36 months postoperatively, leaving enough time for the mesh to absorb. During the first eight days the patients did not report any changes different from prior to the surgery. While 8% reported a recurrence, 6.7% had a seroma that needed to be drained. Considering infections, 4% had superficial infections that required surgical intervention, there were no deep or organ infections and 1.3% needed a mesh removal. Regarding the QoL, as mentioned, there were no major improvements at eight days postoperatively, however, gradually, the functional status of all patients improved, reaching a peak in this study after 36 months (due to the study ending, therefore a longer follow-up would be needed) and being able to perform daily chores quite reasonably. Their pain and anxiety decreased as well.

The hernia size is another important factor that should be taken into account when analyzing the best surgical option. Baccari *et al.* [11] in their study analyzed this aspect, comparing mid- and long-term outcomes of hernias below and above 15 cm. All patients were laparoscopically operated. The patients with hernias above 15 cm had higher recurrence rates, but it was acceptable, when comparing it with the recurrence rate of smaller hernias. What is surprising is that the QoL assessed with the McGillman pain score was better in the larger hernia group than in the smaller one. Complications such as seroma, polmonitis, or prolonged ileus were rare.

As more surgeons started to be interested in the postoperative QoL of the patient, rather than just reconstructing the abdominal wall, more studies were carried out in this direction, finding similar results. In a study by Rogmark *et al.* [5], which included 217 patients, among which 103 presented themselves for a clinical examination, it was stated that by measuring the QoL before and a few weeks after the surgery, the patients agreed to an improved function. A patient database was searched, picking all the discharged patients that underwent an IHR between 1998 and 2006 in order to define the population of this study. Between 2010 and 2012, the clinical exams were performed and in 2015 the medical records were reviewed again to check for any other recurrences. Data collected at one year postoperatively was similar to prior ones, finding differences only in the long run. The QoL of the patients that were operated was higher than of the ones that refused surgery. All of the scales of the SF-36 questionnaire were improved, other than the role function, bodily pain, and emotional pain. Roughly, 80% of the patients were satisfied with the results. The recurrence rates between the primary and secondary incisional hernia repair were similar (7.1% vs 10.9%), even though a secondary IH carries more complications and therefore is more complex. Though if the hernia was asymptomatic, there was no need for another repair. Patients who suffered from recurrence, chronic pain, or altered bodily function had lower QoL. This is one of the most longevous studies, assessing the patients for over 11 years. It is also worth mentioning that patients with recurrences had more intense pain and lower physical function than patients without [3].

In another study [22], similar results were found, having 80% of the patients satisfied with their overall results, and chronic pain or recurrence being the main complaints at seven years postoperatively. Complications were registered for 27% of the patients, but mostly between the Clavien-Dindo grades I and II. Additionally, 9% were operated within 90 days for various complications, such as deep wound infection or an arterial bleeding, but no mesh was explanted. The results of the SF-36 questionnaire were comparable to that of people who suffer from one or two chronic diseases. What is surprising is that even if the QoL could be considered quite low in this case, most patients were pleased with the results. This makes us believe that the QoL is not entirely influenced by the operation itself, but also by additional health problems. Around 9.8% were taking painkillers on a daily basis due to the pain. Among the patients that were not pleased, all of them suffered from chronic pain and only a half had a recurrence. At the follow up at 11 years, the registered recurrence rate was 8.1%. As highlighted by this study, in several other scientific papers, different recurrence rates were reported, usually varying

between 8% and 30%. The recurrence tends to appear in the very first years after the surgery and then gradually decrease.

Similar results were found in another study [8], where patients that underwent an IHR were matched with a control group and observed for 10 years. Overall, the outcomes of the surgery were excellent, 75% being satisfied with the end results. The SF-36 form showed no actual differences between the two groups, however, the physical function was slightly altered, with a Karnofsky scale of 75. Between the patients who had a previous abdominal surgery and the ones who had no one at that point, no differences were reported. Mental health showed no alteration. Therefore, it is safe to say that an IHR should improve the HRQL.

As shown in another article [23], the IHR impacts life on many of its dimensions. In this study, Lee *et al.* had them grouped in 10 parts. One of them was the impact on daily life, where patients complained that due to chronic pain or fear of a recurrence they cannot perform activities such as playing with the nephews or having a job anymore. Similarly, the other dimensions were affected, such as the emotional health, where the main concern was a continuous state of anxiety on a daily basis, even years after the surgery, because of any potential complications that could arise. Pain was another concern, simply because it was harder than usual to pinpoint the exact cause and it took a toll on the patients' emotional status. Even so, in most cases, a visit to the doctor could pinpoint the exact problem. Consumption of analgesics is another problem for patients who suffer from chronic pain, for both the financial and health status. Moreover, many participants expressed a need for better communication with the health personnel, to the extent of even asking questions regarding the risks and benefits of the procedure, to ensure that the patients have a correct understanding. Support groups are also a wish for many of them. Having the ability to share their experiences and give advice to others could aid their recovery, both mentally and physically.

Similar results were found in a study by Langbach *et al.* [24], but what is interesting is that they also made a comparison between men and women. The differences were not that significant, however, it seems that women have a better tolerance to pain if a positive attitude is maintained. Between the OVHR and LVHR there were no major differences, this being in accordance with another study [3]. Both improved physical function and mental health, but women seemed to have lower scores than men.

Moreover, another study [25] showed that despite the patients confirming an improved function, up to 63% indicated postoperative symptoms, such as pain or discomfort associated with both rest and movement. A fifth of them saw no actual improvements and another fifth considered their state to be worsened, confirming data

from previous studies. The main disappointment that was stated is the lack of proper preoperative counselling, where all possible outcomes should have been presented. By knowing such information, some patients (10%) said that they would have denied the surgery. Having up to 30% complaining of feelings of discomfort is quite disheartening, considering that the IHR is presented as the very solution to such complaints. Another interesting point that is made in this study is the discrepancy between what a surgeon and a patient take into account when considering the success of the surgery. The surgeon is more interested in restoring the integrity of the abdominal wall, whereas the patient's wishes are based on ceasing the pain, receiving visually pleasing results, and performing daily activities with the same ease as before the hernia occurrence. As shown in another study [4], indeed, an altered abdominal wall changes the distribution of the forces, affecting the neuromuscular system. The movements and the gait of such a person would be altered. Such consequences would be assessed using a barycenter variation evaluation, and eventually the POMA scale. As observed in this research, the patient who had an IHR done showed improvements in both these scores. Therefore, better communication should be adopted between the two sides, and even though there is no actual tool to determine the success of an IHR, a set of values agreed upon by both surgeons and patients should be the key.

Therefore, after analyzing the information presented in this study, the following factors have been shown to influence the QoL after IHR in a positive or negative manner.

TABLE 1: Factors influencing the QoL after IHR in a positive or negative manner.

Positive factors	Negative factors
Robotic-assisted surgery [17]	LTD mesh [21]
Modified Chevrel technique [16]	Female gender [24]
Absorbable sutures [19]	Chronic health diseases [22]
Suture fixation without tacks [20]	Lack of communication between patients and health personnel [23]
MTD mesh [21]	
Hernia size > 15 cm [11]	
Male gender [24]	
Thorough communication between patients and health personnel [23]	

4. Conclusion

Statistically, in most of the cases, the patients were satisfied with the results, whereas a small yet significant percentage were accusing chronic pain, strenuous movement, and

recurrence. The recurrence is bound to appear in the earlier postoperative stages and if it is asymptomatic, it is up to the patient to decide whether it should be operated or not. While it is safe to say that the IHR is resulting in an increased QoL, both physically and mentally, it is important to take into account the smaller percentage of people that do not end with such good results. Therefore, better communication between health professionals and patients is needed.

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Ethical Considerations

The current narrative review does not include any research on humans or animals published by the authors.

Competing Interests

The authors declare that they have no competing interests.

Availability of Data and Materials

The dataset used in this narrative review is cited and available online.

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