

## CHRONIC GROIN PAIN FOLLOWING INGUINAL HERNIA REPAIR IN THE LAPAROSCOPIC ERA: A SYSTEMATIC REVIEW

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### ABSTRACT

**Background:** Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Chronic pain is any pain which persists beyond the normal healing period of 12 weeks. Postherniorrhaphy groin pain is defined as pain lasting >3 months after surgery, which is one of the most important complications occurring after inguinal hernia repair, and occurs with greater frequency than previously thought.

**The aim:** This study aims to show chronic groin pain following inguinal hernia repair in the laparoscopic era.

**Methods:** By comparing itself to the standards set by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, this study was able to show that it met all of the requirements. So, the experts were able to make sure that the study was as up-to-date as it was possible to be. For this search approach, publications that came out between 2013 and 2023 were taken into account. Several different online reference sources, like Pubmed and SagePub, were used to do this. It was decided not to take into account review pieces, works that had already been published, or works that were only half done.

**Result:** In the PubMed database, the results of our search brought up 103 articles, whereas the results of our search on SagePub brought up 113 articles. The results of the search conducted for the last year of 2013 yielded a total 80 articles for PubMed and 49 articles for SagePub. The result from title screening, a total 14 articles for PubMed and 8 articles for SagePub. In the end, we compiled a total of 10 papers. We included five research that met the criteria.

**Conclusion:** Chronic pain following inguinal hernia repair causes significant morbidity to patients and should not be ignored. Preemptive analgesia and operation under local anesthesia significantly affect pain. Intraoperative identification and preservation of all inguinal nerves are very important. Early diagnosis and management of chronic pain can remove suffering of the patient.

**Keyword:** Chronic pain, hernia repair, laproscopic, groin.

## INTRODUCTION

Postoperative chronic pain is a special entity within the domain of chronic pain. Chronic postoperative pain occurs following numerous kinds of surgery, from amputations to thoracotomies to inguinal hernia surgery. The chronic pain after inguinal hernia repair has been extensively studied; however, the management is still difficult. Around the globe, millions of groin hernia repairs are conducted annually and 8%–16% of these patients experience chronic pain to a degree that impairs their daily lives 6 months postoperatively. A few percent of these patients experience disabling pain, and due to the large number of groin hernia repairs, the number of patients with disabling pain and discomfort is an important clinical problem. Depending on the degree of pain and the impact on daily activities, an evidence-based treatment option should be offered. A problem with some of the current evidence, based on research in chronic pain after groin hernia repair, is the use of different assessment methods and different lengths of follow-up. Surgeons, scientists, and pain specialists use different assessment methods, ie, researchers use different questionnaires in order to assess chronic pain in research projects, and this limits comparability.<sup>1</sup>

Inguinal hernia is one of the most common surgical pathologies. Postoperative chronic inguinal pain has been reported in 16–62% of patients who undergo inguinal hernia repair. Prevalence of groin pain has been significantly decreased with the adoption of the endoscopic approach, but up to 20% of the patients undergoing laparoscopic repair may still suffer from chronic pain. Although postoperative groin pain is usually mild in nature, quality-of-life studies have shown that chronic pain may significantly interfere with normal daily activity.<sup>2</sup>

The underlying pathogenesis of postoperative groin pain is not completely clear; it may be multifactorial and, in many cases, impossible to define. One possible explanation relates to nerve damage during surgery, but this seems not to be the only factor, as many patients have postoperative sensory diminution without pain. Another commonly cited reason may be associated with chronic foreign body inflammatory response due to the use of mesh. The synthetic mesh is secured to the abdominal wall by tackers or glue, which may also potentially influence postoperative pain.<sup>2</sup>

There are several overlapping causes and mechanisms of pain after prior inguinal hernia repair. Preoperative and other non-surgery-related causes of CPIP have to be considered and differentiated. Nociceptive pain is mediated by tissue damage and (chronic) inflammation without damage of nerve structures. It can be related to recurrence, muscle or ligamentous strain, perineural fibrosis, scarring with or without from mesh, meshoma pain (related to wrinkling, migration, or folding of mesh), and suture or fixation material. Nociceptive pain is characterized as a dull ache over the groin area commonly described as gnawing, tender, pulling, or throbbing.<sup>3</sup>

Neuropathic pain may be caused by direct nerve injury or nerve entrapment related to mesh, staples, tacks, suture material, scar tissue, neuroma, or tumor formation. Nerve destruction can also be caused by severe inflammation or infection. Neuropathic pain is described as stabbing, burning, shooting, or pricking, aggravated by walking or sitting. It often also characterized by paraesthesia (burning, pricking, or tingling sensation), hypoesthesia (reduced sensation), allodynia (pain from a nonpainful stimulus), and hyperalgesia (increased sensitivity to pain). The majority of pain experts believe that nerve damage is the most common cause of CPIP.<sup>3</sup>

## METHODS

### Protocol

By following the rules provided by Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, the author of this study made certain that it was up to par with the requirements. This is done to ensure that the conclusions drawn from the inquiry are accurate.

### Criteria for Eligibility

For the purpose of this literature review, we compare and contrast of chronic groin pain following inguinal hernia repair in the laparoscopic era. It is possible to accomplish this by researching or investigating chronic groin pain following inguinal hernia repair in the laparoscopic era. As the primary purpose of this piece of writing, demonstrating the relevance of the difficulties that have been identified will take place throughout its entirety.

In order for researchers to take part in the study, it was necessary for them to fulfil the following requirements: 1) The paper needs to be written in English, and it needs to determine about chronic groin pain following inguinal hernia repair in the laparoscopic era. In order for the manuscript to be considered for publication, it needs to meet both of these requirements. 2) The studied papers include several that were published after 2013, but before the time period that this systematic review deems to be relevant. Examples of studies that are not permitted include editorials, submissions that do not have a DOI, review articles that have already been published, and entries that are essentially identical to journal papers that have already been published.

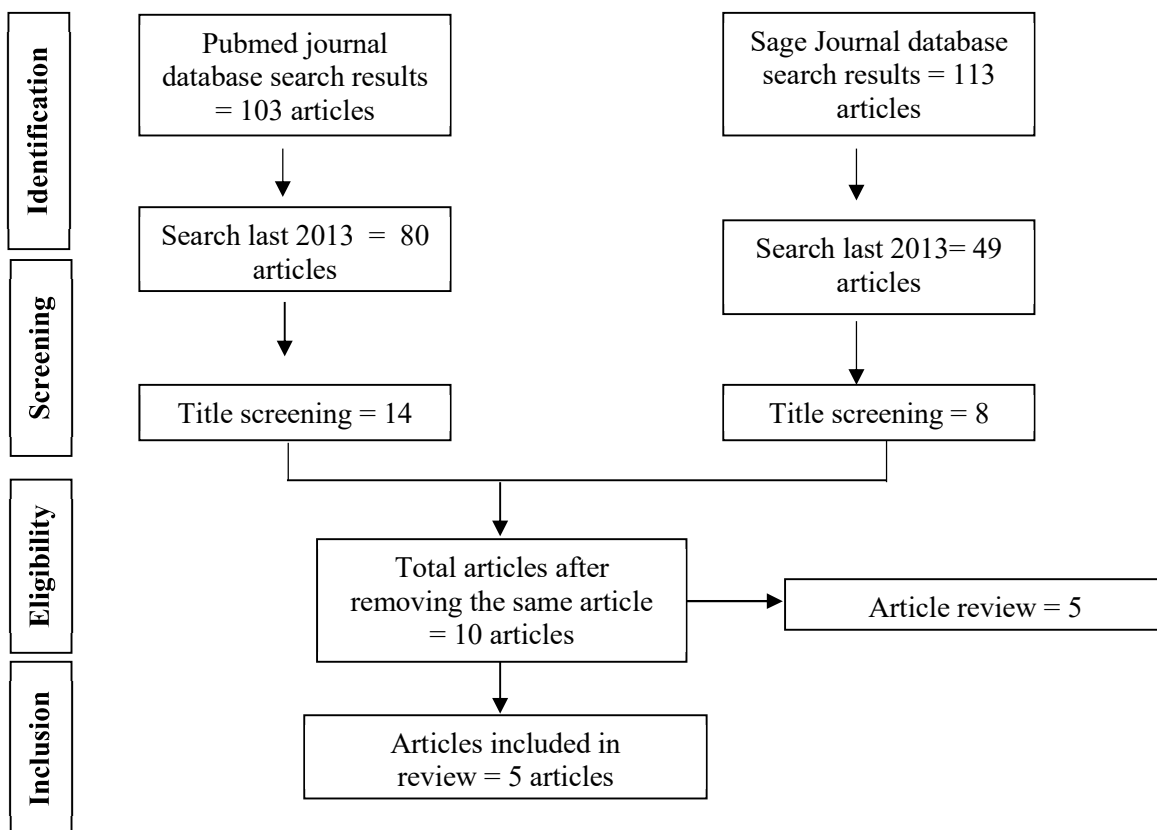
### Search Strategy

We used "chronic groin pain following inguinal hernia repair in the laparoscopic era." as keywords. The search for studies to be included in the systematic review was carried out using the PubMed and SagePub databases by inputting the words:

((*"Inguinal hernia"*[MeSH Subheading] OR *"Symptoms of inguinal hernia"*[All Fields] OR *"groin pain of inguinal hernia"* [All Fields]) AND (*"Inguinal hernia repair"*[All Fields] OR *"laparoscopic of inguinal hernia"* [All Fields]) AND (*"Management of groin pain in inguinal hernia"*[All Fields] OR (*"chronic groin pain"* [All Fields]))) used in searching the literature.

**Data retrieval**

After reading the abstract and the title of each study, the writers performed an examination to determine whether or not the study satisfied the inclusion criteria. The writers then decided which previous research they wanted to utilise as sources for their article and selected those studies. After looking at a number of different research, which all seemed to point to the same trend, this conclusion was drawn. All submissions need to be written in English and can't have been seen anywhere else.



**Figure 1. Article search flowchart**

Only those papers that were able to satisfy all of the inclusion criteria were taken into consideration for the systematic review. This reduces the number of results to only those that are pertinent to the search. We do not take into consideration the conclusions of any study that does not satisfy our requirements. After this, the findings of the research will be analysed in great detail. The following pieces of information were uncovered as a result of the inquiry that was carried out for the purpose of this study: names, authors, publication dates, location, study activities, and parameters.

**Quality Assessment and Data Synthesis**

Each author did their own study on the research that was included in the publication's title and abstract before making a decision about which publications to explore further. The next step will be to evaluate all of the articles that are suitable for inclusion in the review because they match the criteria set forth for that purpose in the review. After that, we'll determine which articles to include in the review depending on the findings that we've uncovered. This criteria is utilised in the process of selecting papers for further assessment. In order to simplify the process as much as feasible when selecting papers to evaluate. Which earlier investigations were carried out, and what elements of those studies made it appropriate to include them in the review, are being discussed here.

**RESULT**

In the PubMed database, the results of our search brought up 103 articles, whereas the results of our search on SagePub brought up 113 articles. The results of the search conducted for the last year of 2013 yielded a total 80 articles for PubMed and 49 articles for SagePub. The result from title screening, a total 14 articles for PubMed and 8 articles for SagePub. In the end, we compiled a total of 10 papers. We included five research that met the criteria.

Ramshaw, B *et al* (2017)<sup>4</sup> showed The principles of CQI can be applied to a group of patients suffering from chronic pain after inguinal hernia repair. Based on these results additional process improvement ideas will be implemented in an attempt to improve outcomes

Bande, D *et al* (2020)<sup>5</sup> showed CPSP affects QoL-related activities, and although it diminishes over the course of 2 years after surgery, many patients continue to have moderate/intense pain and take analgesics. CPSP and neuropathic pain rates seem to be similar after mesh and non-mesh repair. BPI and SF-12 mental component scores detect effects on QoL.

**Table 1. The litelature include in this study**

Author	Origin	Method	Sample Size	Result
Ramshaw, B <i>et al.</i> , 2017 <sup>4</sup>	USA	Retrospective study	93 patients	The results included the assessment of how much improvement was achieved after recovery from the operation. Forty-five patients (48%) reported significant improvement, 39 patients (41%) reported moderate improvement, and 10 patients (11%) reported little or no improvement. There were 3 (3%) complications, 13 (11%) hernia recurrences, and 15 patients (13%) developed a new pain in the inguinal region after the initial pain had resolved.
Bande, D <i>et al.</i> , 2020 <sup>5</sup>	Spain	Multicenter study	1761 patients	In 1761 patients who underwent hernia repair and were eligible for physical examination for CPSP, the incidence of confirmed pain at 4 months was 13.6% (patient-reported pain, 6.2% at 1 year and 4.0% at 2 years). Neuropathic pain was diagnosed in 38.5% of the CPSP patients at 4 months. The incidences of neuropathic CPSP in patients with mesh or non-mesh repairs were similar (38.6 and 33.3%, respectively). SF-12 physical component scores changed little in all patients, whether or not they developed CPSP. The SF-12 mental component decreased significantly in all patients, but the decrease was clinically significant only in CPSP patients. CPSP interfered with activities (18%), work (15.6%), walking (15%) and mood (10.2%). At 2 years 52.1% of CPSP patients had

				moderate/intense pain and 28.2% took analgesics.
<b>Sivarajah, V <i>et al.</i>, 2020<sup>6</sup></b>	UK	Retrospective study	50 patients	The risk of chronic pain was discussed with significantly more patients in 2019 than in 2009 (96% v 54%, $p < 0.0001$ ). Most of these discussions occurred on the day of surgery (92% v 54%, $p < 0.0001$ ). Only a few patients had these discussions during their initial consultation (18% v 4%, $p < 0.025$ ).
<b>Probert, S <i>et al.</i>, 2022<sup>7</sup></b>	UK	Retrospective study	219 patients	In 2015 and 2019, 163 and 56 open inguinal hernia repairs with mesh were performed, respectively. The median age of patients was 63 (28-88) and 64.5 (19-88) in the respective years. Throughout both years there was a predominance in male patients, and the majority of cases were performed on an elective basis. Consent for chronic pain was present in 60.7% and 62.5% of cases in 2015 and 2019, respectively ( $p = 0.055$ ).
<b>Olsson, A <i>et al.</i>, 2023<sup>8</sup></b>				The response rate was 64.5%. In total 19,773 eligible participants responded to the questionnaire, whereof 73.4% had undergone open anterior mesh repair and 26.6% had undergone endo-laparoscopic mesh repair. Registered postoperative complications were: 750 hematomas (2.3%), 516 surgical site infections (1.6%), 395 seromas (1.2%), 1216 urinary tract complications (3.7%), and 520 hernia repairs with acute post-operative pain (1.6%). Among patients who had undergone open anterior mesh repair, an association between persistent pain and hematomas (OR 2.03, CI 1.30–3.18), surgical site infections (OR 2.18, CI 1.27–3.73) and acute post-operative pain (OR 7.46, CI 4.02–13.87) was seen. Analysis of patients with endo-laparoscopic repair showed an association between persistent pain and acute post-operative pain (OR 9.35, CI 3.18–27.48).

Sivarajah, V *et al* (2020)<sup>6</sup> showed Discussing the risk of chronic groin pain has improved significantly over the past 10 years. However, these discussions occur mostly on the day of surgery, which gives patients very little time to weigh up

the risk. This potentially invalidates the consent they give for surgery. Patients should be given an opportunity to discuss their operative risks in advance of their operation.

Probert, S *et al* (2022)<sup>7</sup> showed Despite the importance of adequate consenting practice, we found no significant improvement in consenting practice for chronic pain following open inguinal hernia repair in the four years following the Montgomery ruling.

Olsson, A *et al* (2023)<sup>8</sup> showed Acute postoperative pain was a strong predictor for persistent pain following both open anterior and endo-laparoscopic hernia repair. Surgical site infection and hematoma were predictors for persistent pain following open anterior hernia repair, although the rate of reported postoperative complications was low.

## DISCUSSION

Chronic postoperative inguinal pain (postherniorrhaphy inguinodynia or CPIP) is defined by the International Association for the Study of Pain as "pain beyond three months after inguinal hernia surgery". The incidence of chronic pain following repair with use of a mesh, like the Lichtenstein technique, varies between 5% and 54%, with a pooled incidence of 11% to 16.8%. Some 2% to 6% of patients experience significant restrictions in social and daily activities as a consequence of CPIP, leading to an impairment of health status or 'quality of life' (QoL). Earlier studies reported that people undergoing surgery for recurrent inguinal hernias had a fourfold higher probability of developing moderate to severe pain as compared to those undergoing primary repairs. Although the development of endoscopic techniques for hernia repair has resulted in lower pain incidences (6% to 12.4%), CPIP remains a severe (and probably the most incapacitating) complication following inguinal hernia surgery.<sup>9</sup>

Inguinal hernia is the most common type of hernia in men, with a lifetime risk of 27 per cent. Therefore, with estimated 20 million inguinal repairs performed each year, each improvement in surgical technique translates into substantial public health benefits. Mesh repairs have become standard practice for inguinal hernias, as recurrence rates are lower than those associated with classical tissue repair. Because recurrence rates are now low, the focus of technical improvements has shifted to outcomes such as chronic postoperative pain, which affects up to 30 per cent of all patients after inguinal hernia repair. Chronic postoperative pain is classified by the ICD-11 as pain lasting more than 3 months after surgery. This pain is often neuropathic in character, believed to be caused by tissue and nerve trauma induced by surgical dissection, as well as inflammation and a foreign body reaction owing to the suture material and mesh.<sup>10</sup>

Chronic pain, as a complication of pure tissue repair of inguinal hernia, on the other hand, was an unusual occurrence in the decades preceding large-scale use of prosthetic mesh. The incidence of pain following open repair without mesh was usually related to the entrapment of a nerve by suture or the formation of a neuroma following section of a nerve. Postinguinal herniorrhaphy pain rarely rated more than a sentence or two in major textbooks.<sup>11</sup>

Complications of hernia repair have changed dramatically since the widespread introduction of synthetic mesh for repair of inguinal hernia. Current literature suggests that hernia recurrence following repair with mesh is quite low, varying between 0 and 1.7%. Chronic pain, defined as pain persisting beyond the normal tissue healing time of 3 months, however, has increased dramatically. Chronic posthernioplasty pain is now one of the most common complications following inguinal hernia repair. The incidence of disabling chronic pain 1 year after surgical repair was reported to be approximately 11% by the Danish Hernia Data Base group in 2001. More recently, Reinpold *et al* reported a 16.5% incidence of chronic pain 6 months after surgical repair.<sup>11</sup>

The Brazilian cohort study of 67 patients by Maliska *et al.* compared quality of life using the SF-36 survey between preoperative and postoperative periods (3 month postoperative), after open hernia repair. A significant improvement was observed in the domains of physical aspect and pain, and significant differences were seen in the domains of functional capacity, mental health, social aspects, and emotional aspects. Only the domains of overall health and vitality did not demonstrate a statistically significant improvement ( $p>0.05$ ). A similar result was found in our study in the late postoperative period of TEP and TAPP, in which the lowest means were obtained in the domains of vitality, mental health, and overall health state, while the highest mean was also in the domain of functional capacity. Our results are similar to the studies mentioned. However, there is a lack of studies that utilize the SF-36 scale as a parameter for evaluating quality of life comparing TAPP and TEP inguinal hernia repair techniques.<sup>12</sup>

## CONCLUSION

Chronic pain following inguinal hernia repair causes significant morbidity to patients and should not be ignored. Preemptive analgesia and operation under local anesthesia significantly affect pain. Intraoperative identification and preservation of all inguinal nerves are very important. Early diagnosis and management of chronic pain can remove suffering of the patient.

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