

## Incidence, Causes and Management of Chronic Pain after Inguinal Hernia Repair

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### Abstract

The surgical repair of inguinal hernias is one of the most common general surgery procedures and up to 50% of surgical repair of inguinal hernia patients will suffer from chronic post-surgical pain (CPSP). The objective of this study is to evaluate the incidence, causes and possible management of CPSP in patients undergoing inguinal hernia repair. For that, we performed an extensive literature search of the Medline, Cochrane, and EMBASE databases on 20 October 2019 using the medical subject headings (MeSH) terms. Papers discussing the incidence, causes, and management of chronic pain after inguinal hernia repair were screened for relevant information. Incidence of CPSP following inguinal hernia repair is highly variable in the literature from 2% to 35%, according to the procedure used, pain definition and evaluation method and time of assessment after surgery. In open repair procedures, an elective division of the ilioinguinal nerve has shown a significant effect on reduction of the pain at 6 months post-operative; including moderate and severe pain. In laparoscopic repair, the incidence of chronic pain was significantly lower when compared to open procedure, Shouldice and other non-mesh techniques. The CPSP is a mix of different etiologies with overlapping types of pain including; neuropathic pain, non-neuropathic pain, somatic pain, and pain of visceral origin. The first step in management plan of CPSP is the careful examination of the patient, followed by clear explanation of the condition to the patient. Systematic pharmacological analgesics, non-pharmacological management or surgical treatment can be used with persistent pain.

**Keywords:** Inguinal Hernia; Chronic Pain; Incidence; Causes; Management

### Introduction

The surgical repair of inguinal hernias is one of the most common general surgery procedures; comprising about 10% to 15% of all surgical procedures worldwide [1,2]. Every year, about 20 million inguinal hernia repairs are being performed all over the world with

specific rates among countries ranging from 100 to 300/100,000 population [3]. About 100,000 hernias are being repaired annually in the United Kingdom, while 800,000 repairs were reported in the United States [1,4]. Moreover, there is a lifetime risk of 27% in men and 30% in women to have an inguinal hernia repair [2]. For most patients, the surgical repair of inguinal hernia is highly successful with almost no post-operative long-term complications [5]. However, chronic pain has been reported as the most common long-term complication following hernia repair surgeries [6].

According to the International Association for the Study of Pain (IASP), chronic post-surgical pain (CPSP) is the pain lasting for two months or more following the surgical procedure, after excluding any other cause of pain [7,8]. Other suggested definition of pain has extended the pain duration to three to six months after surgery, which can be more consistent with the broad definition of chronic pain with longer follow up of the patient's prognosis [9]. Chronic pain can be a devastating condition with associated anxiety, cognitive impairment, depression and sleep deprivation [10-12]. Accordingly, the progressive worsening of the pain will happen with marked reduction of the quality of life [13].

Up to 50% of surgical repair of inguinal hernia patients will suffer from CPSP with 11.5% of the patients report pain one year following the procedure [8,14,15]. Nevertheless, the prevalence of CPSP is variable among different surgical techniques; being higher in open inguinal repair (7.3%), as compared to the laparoscopic procedure (5%) [16].

### Objective of the Study

The objective of this study is to evaluate the incidence, causes and possible management of CPSP in patients undergoing inguinal hernia repair. This will help in assessing the problem and implement actions that could improve the quality of life in those patients.

### Methods

We performed an extensive literature search of the Medline, Cochrane, and EMBASE databases on 20 October 2019 using the medical subject headings (MeSH) terms. Papers discussing the incidence, causes, and management of chronic pain after inguinal hernia repair were screened for relevant information. There were no limits on date, language, age of participants or publication type.

### Incidence of CPSP following inguinal hernia repair

Incidence of CPSP following inguinal hernia repair is highly variable in the literature from 2% to 35%, according to the procedure used, pain definition and evaluation method and time of assessment after surgery [17-20]. A review of the literature between 1987 and 2000 has shown an overall incidence of 25% with moderate to severe pain reported in 10% of the patients [21]. A recent meta-analysis of randomized clinical trials has shown that 9.4% of the patients having open inguinal hernia repair will suffer from chronic groin pain at six months post-operative [22]. However, this percentage will drop off to 4.8% of the patients at one-year post-operative [22]. Additionally, elective division of the ilioinguinal nerve has shown a significant effect on reduction of the pain at 6 months post-operative; including moderate and severe pain [22]. Noteworthy, this elective division has caused an increase in groin numbness and lost its beneficial effect at one-year post-operative [22].

In the same context, laparoscopic hernia repair has a lower incidence of chronic pain with only 6 - 7% of the patients reporting CPSP and even lower rates reported by the European Hernia Society (EHS) [23-26]. Moreover, the incidence of chronic pain was significantly lower ( $P < 0.001$ ) when compared to Shouldice (5.4%) and other non-mesh techniques (9%) [27]. The laparoscopic procedure, with transabdominal preperitoneal (TAPP) repair or totally extraperitoneal (TEP) repair have shown less incidence of CPSP compared to open surgery, with or without mesh [20,24,28-32]. A large cross-sectional study of 1,383 patients has found a decline in CPSP prevalence one to five years following laparoscopic repair, with distinct reduction 3.5 years post-operative [23].

### Causes of CPSP following inguinal hernia repair

It is suggested that CPSP is a mix of different etiologies rather one a single one and the mechanism is complex and variable in nature [6]. A possible approach to explain the CPSP is to separate it according to different types of pain including; neuropathic pain, non-neuro-

pathic pain, somatic pain, and pain of visceral origin [6]. Noteworthy, there is an obvious overlap between all of these types, which makes diagnosis and management of CPSP a challenging issue.

### Causes of neuropathic pain

Damage or trauma to the inguinal nerves is the main cause of neuropathic pain in CPSP [6,21,33]. The nerve damage can be inflicted intraoperatively or postoperatively and may involve the genital or femoral branches of the genitofemoral nerve, the iliohypogastric nerve, the ilioinguinal nerve, and the lateral femoral cutaneous nerve [6,21,33]. The intraoperative damage can be done by direct trauma to the nerve with partial or complete transection, while the post-operative damage can be caused by entrapment/irritation by an excessive fibrotic reaction, a meshoma, or inflammatory processes [6,21,33]. Following the distribution of the affected nerves is characteristic of this type of pain [6,21,33].

### Non-neuropathic and somatic pain

The non-neuropathic pain can be elicited by hernia recurrence, excessive scar tissue, meshoma, mesh-associated fibrosis or the bulk of the mesh [6,34,35]. On the other hand, deep placement of the anchoring of the mesh or periosteal anchoring close to the pubic tubercle can cause periostitis pubis; a well-established form of somatic pain [6,21,33,36,37].

### Visceral pain

There are many possible sources of visceral pain in hernia repair patients. The intestinal involvement with incarceration, recurrence or adherent mesh can all lead to visceral pain [6,21,33,37]. Moreover, the spermatic cord (as in congestion or twisting), periurethral structures, the ejaculatory effector muscles (dyssynergia); are all sources of visceral pain [6,21,33,37].

### Management of CPSP following inguinal hernia repair

According to two different recent reviews, there is a lack of evidence regarding the management of the CPSP; making it difficult to draw any firm recommendations based on safety or efficacy [38,39]. For CPSP following inguinal hernia repair, multiple approaches can be used; including close observation, pharmacological and non-pharmacological management [38].

#### Close observation

The first step in the management plan of CPSP is the careful examination of the patient, followed by clear explanation of the condition to the patient [38]. Only close observation can be used since the pain usually has a declining course [38,40]. Moreover, the limited use of analgesics can be used during this observation to improve the quality of life [12,38,40]. Nevertheless, a systematic pharmacological analgesics should be administered whenever the pain does not improve [38].

#### Pharmacological management

For managing the CPSP, the systematic pharmacological analgesics should be tried as the first line of treatment [38]. These drugs include; nonsteroidal anti-inflammatory drugs (NSAIDs), antidepressants, and/or conventional analgesics [6,38]. The local application of analgesics did not show any significant benefit so, it is not recommended for CPSP treatment [38,41,42].

In the same context, different combinations of injections have been proposed for the treatment of CPSP [38]. The injection of local anesthetics did not show a significant effect even with direct injection of tender points, where the relieving effect did not last for a long time [43,44]. Additionally, injections with a mix of lidocaine, corticosteroids, and hyaluronic acid have shown an improvement in 22% of the patients with 4% of the patients have shown minor complications [38,45]. This study has concluded that these mixed injections should be tried prior to the surgical option with neurectomy [38,45].

#### Non-pharmacological management

A nerve block can be induced using the radiofrequency by moderate (only heating) or high intensity (thermocoagulation) either at the peripheral or vertebral levels [38]. Heating the nerve has demonstrated a pain relief lasting up to 20 weeks, while the thermocoagulation

lasted up to 12 months [38,46,47]. Moreover, spinal cord stimulation can be used for pain relief and has shown improvement lasting for up to 12 months [48].

### Surgical management

On failure of other treatments to manage the pain, surgical treatment should be considered [38]. The surgical procedure will include removing the mesh, a neurectomy or both of them [38,40]. The surgical approach will depend on the initial technique with a repeated anterior open approach (following initial anterior approach) and a posterior laparoscopic approach (following initial posterior approach) [38,49].

### Conclusion

CPSP is a very common condition following the inguinal hernia repair surgery. This condition has a complex overlapping etiology and can have a great effect on the quality of life. The meticulous examination along with clear explanation of the condition should be the first steps in management of CPSP cases. Although the condition may have a declining nature, it may also be persistent and necessitate treatment plans ranging from pharmacological and other non-invasive techniques and up to surgical intervention.

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### Conflicts of Interest

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