

Excessive Cauterization of the Liver Bed During Cholecystectomy Causes More Severe Shoulder Pain

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Abstract: Because the diaphragm and shoulder share neural connections, it is thought that the liver bed cauterization related to shoulder discomfort through laparoscopic cholecystectomy is caused by referred pain, which occurs when pain sensations from one location are felt in another. The aim of this article is to investigate the association between cauterisation of the liver bed and shoulder pain after laparoscopic cholecystectomy. The surgical outcomes of 97 patients with acute gallbladder disease were recorded. All patients underwent laparoscopic cholecystectomy. The medical team examined the patients for Glisson's capsule cauterisation, as all patients had a visceral peritoneal injury. Abdominal pain scores were recorded using a visual analogue scale 24 hours after surgery. Shoulder pain scores were recorded, and postoperative complications were determined. The findings demonstrated that males had a BMI of 29.0–32.9 kg/m², with a percentage of 35.05%, while females had a BMI of 46.39%. The prevalence of the hepatitis C virus was 86.60%, operative time for laparoscopic cholecystectomy was 87.32 ± 14.65 minutes, operative bleeding was 40.21%, 22.68% of cases resulted in ICU admission, hospital stays averaged 4.1 ± 1.2 days, and 12 cases resulted in mortality, while 24 cases resulted in complications. In a study of 74% of patients with postoperative infection, 15 cases of postoperative pain were treated with opioid-based rescue analgesia. The study found that 92.78% of patients received paracetamol, while 25.77% received tramadol.

Additionally, 15 patients (15.46%) experienced nausea and vomiting, and 7 (7.22%) had abdominal pain. After 24 hours, the mean shoulder pain score was 0.57 ± 0.17, and the mean abdominal pain score was 2.7 ± 0.1. The article finds that the Glisson capsule is associated with a considerable exacerbation of discomfort during and following cholecystectomy.

Keywords: Laparoscopic Cholecystectomy; Glisson's Capsule Injury; Postoperative Pain; Shoulder Pain; And Complications.

INTRODUCTION

One of the most popular abdominal surgical procedures, laparoscopic cholecystectomy, is regarded as the "gold standard" for the surgical management of gallstone disease [1,2]. Compared to standard open treatment, the method has the benefits of less analgesia, less postoperative discomfort, and a faster recovery and hospital stay. [3]

Three categories of pain can be distinguished during laparoscopic cholecystectomy: shoulder, parietal, and visceral discomfort [4]. The surgical dissection, as well as tissue stretching in the gallbladder bed,

are often the causes of visceral discomfort. The visceral peritoneum, which covers most of the abdominal viscera, receives the same nerve supply that the nearby viscera and is responsible for this kind of discomfort [6]. The damage to the abdomen wall from the trocar insertion results in parietal or somatic discomfort. Postoperative shoulder discomfort is common and is believed to be caused by leftover carbon dioxide. [7,8,9]

Somatic nociception, as opposed to visceral nociception, is often the basis for studies of pain processes [10]. With sufficient visceral stimuli examined in research models, accessing visceral structures is linked to more difficulties. Both pain stimuli have similar nociceptive processes, but their neurology and psychology are different. The management of both types of pain is mostly unaffected by the underlying illness. As a result, the pain is considered a condition rather than a sign or consequence of disease. [11,12,13]

The liver capsule, also known as Glisson's capsule or the visceral peritoneum lining the liver, maybe accidentally be cauterized during gallbladder dissection if a cautery tool slips, or it may be necessary during manipulation because of a challenging dissection [14]. There has not been a thorough investigation into the potential connection between visceral peritoneal damage and postoperative discomfort. [15]

METHODOLOGY

Ninety-seven patients in all had our article evaluated. Patients with coexisting chronic conditions, such as cancer, liver, lung, or renal insufficiencies, or osteoporosis, were not included. Ninety-seven individuals were scheduled with laparoscopic cholecystectomy after these patients were excluded. Prior to surgery, demographic information such as height in meters, weight in kilos, age, and gender were noted. The body mass index was computed by dividing the weight in kilograms by the height in meters squared (kg/m^2). Before the procedure, participants were given an explanation about the visual analog scale (VAS), which is rated between 0 (no pain) - 10 (the greatest agony possible). Approximately one hour prior to anesthesia, the patients had been premedicated with 10 mg of oral diazepam. Standardized monitoring (electrocardiography, noninvasive blood pressure, pulse oximetry, and CO₂ analysis) was part of the anesthesia protocol that was administered to all patients. Four trocars (two 5mm and two 10mm) were used for the standard laparoscopic cholecystectomy, and all patients had a justified CO₂ pneumoperitoneum created at a pressure of 12 mmHg. After making a transverse incision immediately under the umbilicus, the fascia was positioned upwards using a Kocher clamp to insert the Veress needle that was used for the first entrance and insufflation. Metamizol sodium 1 mg was administered intravenously (IV) during the induction of anesthesia as part of a standardized postoperative analgesic regimen. This was repeated every 6 hours for the first 24 hours following surgery. 500 mg of oral paracetamol was started 30 minutes prior to the procedure and was taken again every six hours during the initial 24 hours following the procedure. If the patient reported inadequate pain reduction with normal analgesia or if the VAS pain score was higher than 4, titrated intravenous doses of tramadol were given as rescue opioid analgesia. Any damage produced by cauterization over the Glisson's capsule of the liver, located distant from the gallbladder dissection area, that was larger than 3 mm (determined by measuring the length of the tip of a 5 mm laparoscopic dissector by 3 mm) was classified as "cauterized." Patients were split into two groups based on whether they experienced cauterization; "cauterized" patients were included in the study group. The quantity of opioid analgesia given and the VAS ratings of abdominal pain at two and twenty-four hours after surgery were the main outcome variables. Following the completion of a 24-hour VAS score, patients with problems were released 24 hours following surgery.

RESULTS

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS.

Variables	N = 97	%
Age, year		
30 – 40	26	26.80%
41 – 50	30	30.93%
51 – 60	41	42.27%
Gender, M/F		
Male	34	35.05%
Female	63	64.95%
BMI, Kg/m²		
24.0 – 28.9	25	25.77%
29.0 – 32.9	45	46.39%
33.0 – 36.0	27	27.84%
Poor diet		
Yes	65	67.01%
No	32	32.99%
Smoking status		
Smokers	51	52.58%
Non - smokers	46	47.42%
ASA score		
I	16	16.49%
II	71	73.20%
III	10	10.31%
Education status		
Primary	18	18.56%
Secondary	26	26.80%
University – Postgraduate	53	54.64%
Employment status		
Employed	34	35.05%
Un – employed	63	64.95%

TABLE 2. EXAMINATION OUTCOMES OF PATIENTS.

Variables	N = 97	%
Cirrhosis cause		
Hepatitis C virus	84	86.60%
Hepatitis B virus	7	7.22%
Budd Chiari syndrome	2	2.06%
Cryptogenic	4	4.12%
Indicators		
Patients with abdominal pain	97	100.0%
Patients with shoulder pain	59	60.82%
Other examinations		
AST (U/L) (Mean ± SD)	34.18 ± 14.62	
ALT (U/L) (Mean ± SD)	35.88 ± 14.73	
Alkaline phosphatase (U/L) (Mean ± SD)	86.93 ± 41.56	
Creatinine (mg/dL) (Mean ± SD)	0.8 ± 0.2	
Platelet count (1000/ μ L) (Mean ± SD)	255.31 ± 96.14	

TABLE 3. SURGERY DATA.

Parameters	N = 97	%
Operative time, minutes, (Mean ± SD)	87.32 ± 14.65	
Operative adhesions, n (%)		
Yes	23	23.71%
No	74	76.29%
Operative bleeding, n (%)		
Yes	39	40.21%
No	58	59.79%
Blood transfusion, n (%)		
Yes	14	14.43%
No	83	85.57%
Plasma transfusion, n (%)		
Yes	34	35.05%
No	63	64.95%
Platelets transfusion, n (%)		
Yes	0	0%

No	97	100%
ICU admission, n (%)		
Yes	22	22.68%
No	75	77.32%
Hospital stays (days), (Mean ± SD)	4.1 ± 1.2	
60 days mortality, n (%)		
Yes	12	12.37%
No	85	87.63%
60 days complications, n (%)		
Yes	24	24.74%
No	73	75.26%
Biliary injury	1	1.03%
Operative site hematoma	3	3.09%
Postoperative infection	15	15.46%
Wound infection	3	3.09%
Gastric injury	2	2.06%

TABLE 4. POSTOPERATIVE OPIOID ANALGESICS USED IN THIS STUDY.

Items	N = 97	%
Patients who received Paracetamol	90	92.78%
Patients who received tramadol	25	25.77%
Patients with nausea/vomiting	15 (15.46%)/7 (7.22%)	

TABLE 5. POST-OPERATIVE PAIN DATA.

VARIABLES	MEAN ± SD
<i>ABDOMINAL PAIN SCORES, VAS SCALE</i>	
2 Minutes	5.3 ± 0.8
3 hours	4.4 ± 0.5
12 hours	3.1 ± 0.2
24 hours	2.7 ± 0.1
<i>SHOULDER PAIN SCORES, VRS SCALE</i>	
2 Minutes	1.40 ± 0.61
3 hours	0.73 ± 1.02
12 hours	0.33 ± 0.66
24 hours	0.57 ± 0.17

DISCUSSION

Beneath liver parts IVB and V lies a pear-shaped organ called the gallbladder. Its inferior peritoneal surface is in close proximity to the liver's gallbladder bed. However, the gallbladder is not considered an extension from the peritoneum since it is separated of the liver parenchyma by the cystic plate, which is a condensation with fibroareolar tissue [16]. Glisson's capsule is a layer of connective tissue that envelops the liver and is comparable to the visceral peritoneum of the liver [17]. It produces discomfort within the upper right quadrant and covers the liver's bile ducts, portal vein, and hepatic artery. A damage to the visceral peritoneum was defined in this study as the cauterization of the liver's Glisson's capsule during the gallbladder dissection. We discovered that people who had Glisson's capsule of the liver cauterized during laparoscopic cholecystectomy had considerably greater abdominal pain levels as determined by the VAS and that the VAS values at two hours after surgery were higher than those at twenty-four hours [18]. According to some research, the majority of pain during the early postoperative phase is caused by visceral discomfort.8. According to other research, the parietal peritoneum, that originates from the location of the incision, accounts for the highest portion of abdominal discomfort [19,20]. Pneumoperitoneum and surgical operations like cholecystectomy follow. It has been demonstrated that within the first 48 hours following a laparoscopic cholecystectomy, pain from the surgical incision is more severe than visceral discomfort, making it the most significant factor [21]. According to reports, visceral pain syndromes were less severe in older persons than in younger ones [22]. It is believed that visceral pain is felt greater diffusely than noxious cutaneous stimulation in terms of location and timing because it manifests as a diffuse and poorly defined feeling brought on by the activation of nociceptors within the thoracic, pelvic, or abdominal viscera (organs) [23]. This problem might be seen as a crucial element in determining how severe the postoperative pain is [24]. The exclusion criteria in our investigation were justified by the possibility that they may influence the onset and intensity of postoperative pain. Postoperative pain may be impacted by acute cholecystitis due to its severe inflammation. By lengthening the period of anesthesia and requiring more medication, operations lasting longer than ninety minutes may also have an impact on postoperative pain. This study shows that following laparoscopic cholecystectomy, cauterization of the liver's Glisson's capsule increases postoperative discomfort and the requirement for opioid analgesia. There are some potential drawbacks to the study [25,26]. There might be additional variables at play, such as variations in the liver parenchyma's cauterization [27]. The cauterization of the liver's Glisson's capsule may be the cause of the variation of the postoperative VAS score as well as the necessity for opioid use if these other contributing variables are assumed to be the same for every patient. However, the surgeon has a unique opportunity to enhance the result by making little adjustments to the technique, that will affect numerous aspects [28]. It is advised that surgeons make an effort to avoid needless liver cauterization in light of the study's findings. [29,30]

CONCLUSION

According to this article, postoperative pain is negatively impacted when the liver's Glisson's capsule is cauterized during laparoscopic cholecystectomy. This is because referred pain at the shoulder region may result from irritation or injury to the diaphragm and specific nerves which innervate the shoulder during the treatment.

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