International Surgery Journal
Hamada T et al. Int Surg J. 2018 Mar;5(3):778-783
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20180797

Original Research Article

Evaluation of chronic pain after transabdominal preperitoneal hernia repair

Takashi Hamada[1*], Tomohiko Adachi[1], Hajime Matsushima[1], Hiroki Moriuchi[1], Toru Iwata[1], Susumu Eguchi[2]

[1]Department of Surgery, Nagasaki Rousai Hospital, Setogoshi, Sasebo, Japan
[2]Department of Surgery, Nagasaki University Graduate School of Biomedical Sciences, Sakamoto, Nagasaki, Japan

Received: 22 December 2017
Revised: 10 January 2018
Accepted: 30 January 2018

***Correspondence:**
Dr. Takashi Hamada,
E-mail: ra5555@rediffmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Early postoperative pain after transabdominal preperitoneal hernia repair (TAPP) has been frequently reported. However, the incidence and degree of chronic pain after TAPP have not been evaluated. Therefore, author aimed to examine chronic pain after TAPP.
Methods: A total of 256 who underwent TAPP between November 2008 and March 2015 at the institute were enrolled. Original questionnaires focusing on the current state of pain were sent to the enrolled patients by mail. The incidence, body location, and degree of chronic pain occurring at least 6 months after the initial surgery were evaluated. In addition, a medical chart review of patients with and without chronic pain was performed to determine the predictive factors of chronic pain.
Results: The survey response rate was 43.8% (112/256). The median follow-up period after the initial surgery was 44.3 months (range, 9.7-80.3 months). Sixty percent of patients experienced pain after TAPP; however, in 56.2% of the patients, the pain had mitigated 1 week after TAPP. Ten percent (12/112) of the patients had chronic pain 6 months after TAPP. Pain in the inguinal region was more frequently reported than any other wound region (67% vs 25%, p =0.0009). Although most of the patients with pain felt the pain occasionally, three of twelve patients (25%) complained of daily pain and had high VAS score. No significant predictive factors of chronic pain were identified.
Conclusions: Ten percent of patients experienced chronic pain after TAPP. Large scale prospective trials are needed to identify the predictive factors of chronic pain.

Keywords: Chronic pain, Transabdominal preperitoneal hernia repair

INTRODUCTION

Inguinal hernia is one of the most common diseases requiring surgical treatment.[1] The lifetime prevalence for inguinal hernia is high and has been reported to be 27% in men and 3% in women.[2] The surgical strategy for inguinal hernia has developed over time. The first laparoscopic inguinal hernia repair was reported in 1990 by Ger et al and involved simply covering the internal defect with an intraperitoneal mesh.[3] In 1992, Arregui et al and Dion and Morin described the TAPP approach, which requires intraperitoneal access to position the mesh in a preperitoneal space.[4,5] Currently, totally extraperitoneal hernia repair (TEP) and TAPP are frequently performed.[6] Many debates regarding traditional open repair versus laparoscopic repair have

been published.[1,7-9] Laparoscopic hernia repair has been reported to have advantages such as an earlier return to work, quicker resumption of normal activity, and a reduced incidence of chronic inguinal pain and numbness.

Postoperative pain is a major concern in inguinal hernia repair. Laparoscopic hernia repair has been reported to be associated with a reduction of pain in the early postoperative period compared to that for open repair.[9] While it is known that some patients undergoing open repair experience postoperative chronic pain for several months, chronic pain after laparoscopic repair has not been well evaluated.[10,11] Although Nienhuijs et al. reported that less chronic pain occurred after laparoscopic repair compared to that for open repair, the observation period was relatively short (3 months) for the evaluation of chronic pain.[12] Moreover, few trials have been conducted evaluating the frequency or degree of chronic pain after laparoscopic repair.[13] Therefore, the aim of this study was to examine the frequency and degree of chronic pain after TAPP, and to identify perioperative factors predicting the occurrence of chronic pain.

METHODS

Patients

This study was conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from all patients included in this study. A total of 279 consecutive patients who underwent TAPP between September 2008 and March 2015 and had a post-TAPP period of at least 6 months were initially identified. Among the identified patients, 23 were excluded from the present study due to loss at follow-up. Therefore, the final sample consisted of 256 patients.

Surgical techniques and perioperative management

Although 16 surgeons performed TAPP at the institute during the study period, the basic TAPP procedure remained unchanged. Under general anesthesia and in a dorsal position, a 10mm optic trocar was inserted at the umbilicus. After pneumoperitoneum, the intra-abdominal pressure was maintained at 10mmHg, with two disposable 5mm operating trocars placed on the bilateral sides of the lower abdomen. Laparoscopically, the pneumoperitoneum was incised above the hernia defect and dissection was performed to separate the surrounding structures. The inferior epigastric vessels were identified. A median dissection was performed to reveal Cooper's ligament and the iliopubic tract. For lateral hernias, the sac was reduced and separated from the testicular duct and vessels. For direct hernias, the pseudosac was completely dissected. After adequate space was created around the cord structure, a mesh (Bard 3D MAX, USA) was placed to reinforce the myopectineal orifice. The mesh was fixed on Cooper's ligament and the aponeurotic arch using tackers (Free Disposable Tacker, USA). The peritoneum was closed using a single knot with an absorbable surgical suture or running suture with V-Loc™ (Medtronic, Ireland). No drains were placed in any patient. After the peritoneal closure, the trocars were removed under endoscopic control. The aponeurosis was closed at the umbilical site with an absorbable suture. The skin was closed using 4-0 PDS (Johnson and Johnson, USA) or a skin stapler. All patients received standard postoperative painkillers for 5 days. Postoperative activities were not largely limited. The length of the hospital stay was determined based on the condition of the patient and their demands.

Data collection

An original questionnaire was sent by regular post mail to 256 patients (Table 1). The questionnaire focused on the current physical status of the patient. If the patient had pain, they indicated the pain region (inguinal, scar, or both), provided a VAS score, and indicated the frequency, effect on daily life, and necessity of painkillers.[14] If the patient had no pain, they indicated the amount of time after the operation that had passed when pain disappeared.

Table 1. Questionnaire on chronic pain after TAPP.

Do you currently have any pain in relation to the hernia repair? Yes, A; No, B.		
A	Location	inguinal region
		around the scar (umbilicus or trocar insertion)
		both
	Strength	VAS 0 to 10
	Incidence	every day
		once a week
		occasionally
	Affects daily life	yes
		a little
		no
	Painkiller requirement	every day
		once a week
		occasionally
B	Time at which the pain disappeared	no pain initially
		one week after
		3 months after
		6 months after

TAPP; transabdominal preperitoneal hernia repair, VAS; visual analog scale

Information from the medical records including age, sex, duration after the operation, operative time, blood loss, presence of recurrence, surgeon's experience level, complications, mesh (standard or light; it is lighter than

standard), mesh size (medium;8x3cm or large; 10x16cm), tacker (absorbable or non-absorbable), peritoneal closure (single suture or running suture), and duration of hospital stay were evaluated to identify predictive factors of chronic pain after TAPP.

Statistical analysis

All data were analyzed using SPSS release 9.0.0 standard version (SPSS Inc., Chicago, IL). Univariate analyses were performed using the Mann Whitney U test. P-values <0.05 were considered significant.

RESULTS

A total of 118 patients answered the questionnaires (46.1% of the enrolled patients), and 43.8% (112/256) of the enrolled patients had sufficient data for analysis.

Table 2: Summary of the patients with chronic pain after TAPP.

Case	Follow-up period (months)	Painful region	Frequency of the pain	Vas score
1	65.9	Wound	Sometimes	7
2	63.3	Inguinal	Sometimes	4
3	58.5	Inguinal	Sometimes	5
4	55	Unknown	Everyday	8
5	51.6	Inguinal	Sometimes	1
6	41.9	Wound	Sometimes	1
7	40.3	Inguinal	Sometimes	2
8	35.9	Inguinal	Sometimes	2
9	21.9	Inguinal	Sometimes	1
10	21.5	Wound	Sometimes	2
11	17.1	Inguinal	Everyday	4
12	14.4	Inguinal	Everyday	-

VAS: Visual Analog Scale

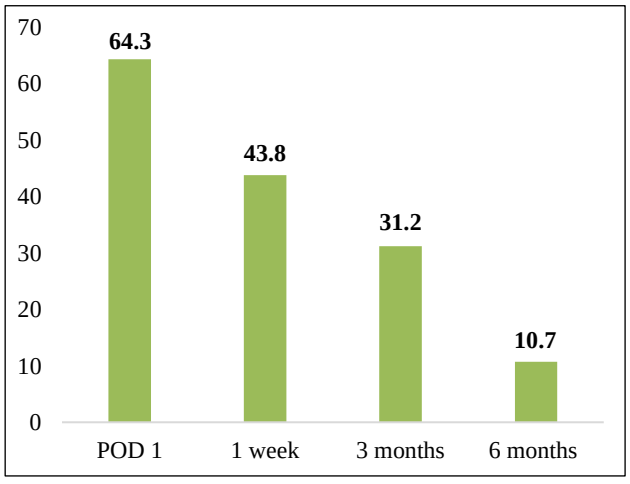

Figure 1: The incidence of chronic pain after TAPP is shown for different postoperative timepoints. Ten percent of the patients had pain occurring 6 months after TAPP.

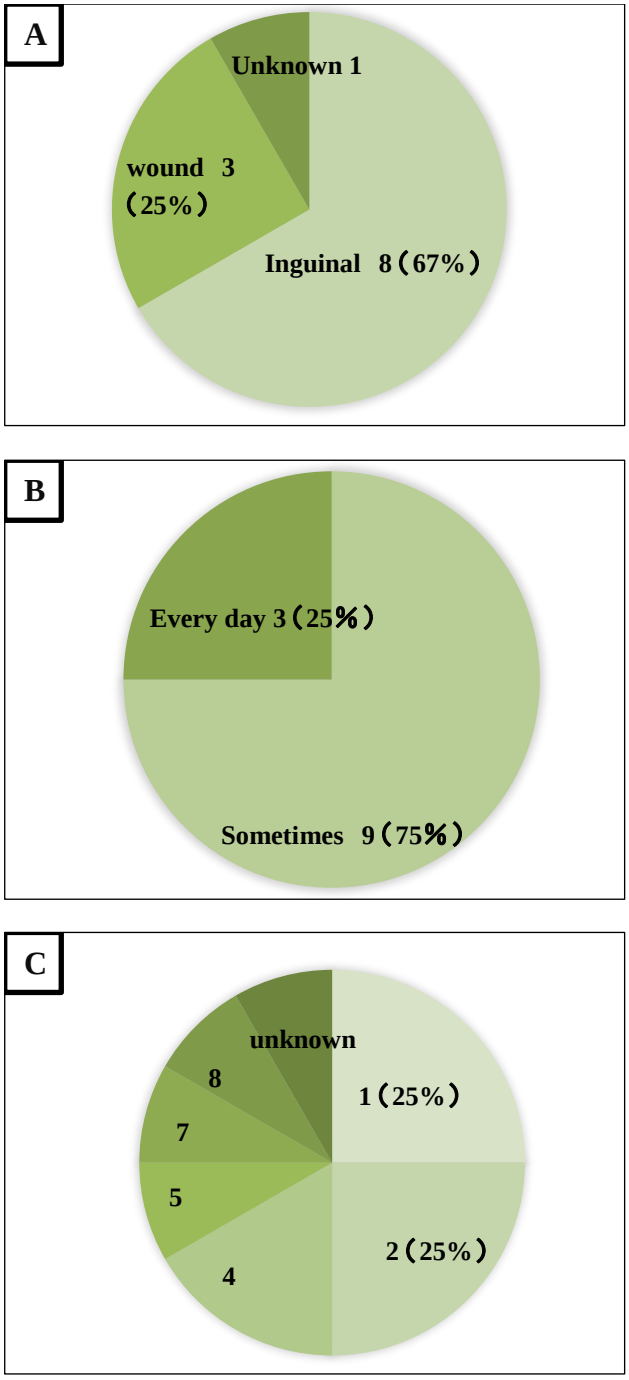

Figure 2: Results of the questionnaire survey for the (A) pain region; (B) frequency of the pain; (C) VAS score are shown.

The median follow-up period was 44.3 months (range, 9.7-80.2 months). Based on the questionnaire survey, 64% of patients indicated feeling pain after TAPP. However, the pain was mitigated by one week after the operation in 23 patients and by 3 months in 14 patients. After 6 months, 10.7% (n=12) of the patients had pain chronically (Figure 1). A summary of the patients with chronic pain is listed in Table 2. For patients with chronic pain, the pain was mostly located in the inguinal region (67%, n=8), and around the wound area for some patients

(25%, n=3). Although most of the patients felt the pain infrequently, 3 patients suffered from pain everyday (2.7%, n=3). In terms of the severity of the pain as assessed using the VAS, 3 patients (2.7%) had an over 5 high VAS score (Figure 2).

Table 3. Characteristics of patients with and without chronic pain.

	Total (n=112)	Pain (-) (n=100)	Pain (+) (n=12)	P value
Sex	Male：99	87	12	0.184
	Female：13	13	0	
Age (years)	67 (24-95)	67 (24-95)	63 (29-87)	0.696
Side	Right	48	3	0.311
	Left	45	8	
	Both	7	1	
Case	First	97	11	0.349
	Recurrence	3	1	
Surgeon's experience level	<5 years	51	5	0.541
	≦6 years	49	7	
Mesh type	Standard	73	8	0.643
	Light	27	4	
Mesh size	Medium	98	12	0.621
	Large	2	0	
Tucker	Non-absorbable	66	7	0.598
	Absorbable	34	5	
Peritoneal closure	Single suture	78	8	0.38
	Running suture	22	4	
Operation time (minutes)	118 (50-263)	120 (50-263)	108 (73-170)	0.454
Complications	No	83	9	0.494
	Yes	17	3	
	(ecchymoma)	9 (9.0%)	1 (8.3%)	
	(seroma)	2 (2.0%)	2 (16.7%)	
	(SSI)	4 (4.0%)	0	
	(postoperative bleeding)	1 (1.0%)	0	
	(umbilical scar diastasis)	1 (1.0%)	0	
Hospital stay (days)	5 (3-21)	5 (3-21)	5 (3-8)	0.102
Follow-up period (months)	44.3 (9.7-80.2)	46 (9.7-80.3)	41 (14.4-65.9)	0.269

Table 3 shows the characteristics of patients with and without chronic pain. No significant between-group differences were found in the patient characteristics, applied device for TAPP, or operative outcomes. Although there were 20 cases with complications during the study period, no intraoperative complications or conversion to an anterior approach occurred in this series. One patient in the chronic pain (-) group had postoperative bleeding and required re-operation on the day after the initial operation. No recurrence occurred in the enrolled patients during the study period.

DISCUSSION

Chronic pain is defined as ‘‘pain lasting for 3 months or more’’ by the international association for the study of Pain.[15] In the early postoperative phase after TAPP, Tolver et al reported that pain was most intense 3 hours after TAPP and declined to low levels within the first 3 days.[16] In the present study, no data were collected at three days after the operation; however, 36% of patients replied that they had initially no pain after TAPP. In addition, 21% of patients indicated that the pain had gone away one week after the operation. In a study investigating pain during later postoperative phases, Köninger et al reported that at a median of 52 months (range, 40-60 months) after TAPP, chronic pain was present in 15% of patients, pain with physical strain was present in 11% of patients, and limitations to daily life, leisure activities, and sports occurred in 2.4% of patients.[17] Similarly, in the present study (with a median follow-up of 44.3 months), chronic pain occurring at least 6 months after the operation was present in 10.7% of the patients. Moreover, 4.5% (5/112) of the patients suffered from chronic pain at over 50 months after TAPP. Therefore, the present study demonstrates that some patients suffer from chronic pain long after TAPP.

Chronic pain after open inguinal hernia repair has been previously evaluated. Several studies have shown that the age of the patient is related to chronic pain after open repair, with the incidence of chronic pain reported to be

39-58% in patients less than 40 years old and 14-17% in patients more than 65 years old.[18-20] Moreover, a nationwide study found a greater incidence of chronic pain in female patients (38%) compared to that for male patients (28%) ($p<0.05$).[18] Wright et al reported that 88% of patients who developed chronic pain had felt pain at the preoperative assessment.[11] Callesen et al found a higher incidence of moderate or severe chronic pain 12 months after a recurrent hernia operation compared to that for a primary hernia operation (14 vs. 3%, $p<0.01$).[21] Therefore, low patient age, female sex, high preoperative pain scores, and recurrent hernia are risk factors for chronic pain after open repair. In contrast, risk factors for chronic pain after laparoscopic repair are unclear. In the present study, age, female sex, high preoperative pain scores, and surgery for recurrent hernia were not different between patients with and without chronic pain after TAPP. Thus, patient characteristics might not have a strong influence on chronic pain after TAPP.

In laparoscopic hernia repair, the device may also be a risk factor for chronic pain. Some reports have suggested that operative devices are responsible for chronic pain after laparoscopic hernia repair.[22] Smith et al reported that stapled fixation had a higher rate of acute and chronic postoperative pain after TAPP.[23] On the other hand, three meta-analyses reported that there were no statistical differences between glue and mechanical fixation in terms of chronic pain.[24-27] To improve postoperative outcomes after TAPP (especially for chronic pain and numbness), Bringman et al recommended the use of light meshes.[28] However, Weyhe et al. found that the use of light meshes was associated with an increased recurrence rate.[29] In the present study, no significant differences in mesh type, mesh size, tucker, or peritoneal closure were found between patients with and without chronic pain. Therefore, we concluded that the utilized devices did not affect the incidence of chronic pain after TAPP. However, some limitations exist in the present study, including the small sample size and the non-randomized study design. Large-scale prospective studies should be conducted to provide reliable clinical evidence, especially for the applied devices, which would help prevent chronic pain after TAPP.

CONCLUSION

In conclusion, chronic pain 6 months after TAPP was observed in approximately 10% of patients, with some patients suffering chronic pain at 50 months after TAPP. The most frequently reported painful region was the inguinal region. Significant perioperative factors predicting the occurrence of chronic pain were not identified in the present study. Therefore, large-scale prospective studies are needed to better identify the predictive factors of chronic pain, and to develop procedures preventing chronic pain.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Grant AM, Scott NW, O'Dwyer PJ. MRC Laparoscopic Groin Hernia Trial Group. Five-year follow-up of a rasndomized trial to assess pain and numbness after laparoscopic or open repair of groin hernia. Br J Surg. 2004;91:1570-4.
2. Primatesta P, Goldacre MJ. Inguinal hernia repair, incidence of elective and emergency surgery, readmission and mortality. Int J Epidemiol. 1996;25:835-9.
3. Ger R, Monroe K, Duvivier R. Management of indirect inguinal hernias by laparoscopic closure of the neck of the sac. Am J Surg. 1990;159:370-3.
4. Arregui ME, Davis CJ, Yucel O. Laparoscopic mesh repair of inguinal hernia using a pre-peritoneal approach: A preliminary report. Surg Laparosc Endosc. 1992;2:53-8.
5. Dion YM, Morin J. Laparoscopic inguinal herniorrhaphy. Can J Surg. 1992;35:209-12.
6. Sharma D, Yadav K. Prospective randomized trial comparing laparoscopic transabdominal preperitoneal (TAPP) and laparoscopic totally extra peritoneal (TEP) approach for bilateral inguinal hernias. Int J Surg. 2015;22:110-7.
7. Moldovanu R, Pavy G. Laparoscopic transabdominal pre-peritoneal (TAPP) procedure-step-by-step tips and tricks. Surgical Technique Chirurgia. 2014;109:407-15.
8. Cawich SO, Mohanty SK, Bonadie KO. Laparoscopic inguinal hernia repair in a developing nation: short-term outcomes in 103 consecutive procedures. J Surg Tech Case Rep. 2013;5:13-7.
9. Salma U, Ahmed I, Ishtiaq S. A comparison of postoperative pain and hospital stay between Lichtenstein's repair and Laparoscopic Transabdominal Preperitoneal (TAPP) repair of inguinal hernia: A randomized controlled trial. Pak J Med Sci. 2015;31(5):1062-6.
10. Muschalla F, Schwarz J, Bittner R. Effectivity of laparoscopic inguinal hernia repair (TAPP) in daily clinical practice: early and long-term result. Surgical endoscopy. 2016;30(11):4985-94.
11. Wright D, Paterson C, Scott N. Five-year follow-up of patients undergoing laparoscopic or open groin hernia repair: a randomized controlled trial. Ann Surg. 2002;235:333-7.
12. Nienhuijs S, Staal E, Strobbe L. Chronic pain after mesh repair of inguinal hernia: a systematic review. Am J Surg. 2007;194:394-400
13. Grant A. Laparoscopic compared with open methods of groin hernia repair: systematic review of randomized controlled trials. Br J Surg. 2000;87(7):860-7.
14. McCormack HM, Horne DJ, Sheather S. Clinical applications of visual analogue scales: a critical review. Psychol Med. 1988:18:1007-19.

15. Merskey HE. Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms. Pain. 1986.
16. Tolver MA. Pain characteristics after laparoscopic inguinal hernia repair. Surg Endosc. 2011;25:3859-64.
17. Koninger J, Redecke J, Butters M. Chronic pain after hernia repair: a randomized trial comparing Shouldice, Lichtenstein and TAPP. Langenbecks Arch Surg. 2004;389:361-5.
18. Bay-Nielsen M, Perkins FM, Kehlet H. Pain and functional impairment 1 year after inguinal herniorrhaphy: a nationwide questionnaire study. Ann Surg. 2001;233:1-7.
19. Courtney CA, Duffy K, Serpell MG. Outcome of patients with severe chronic pain following repair of groin hernia. Br J Surg. 2002;89:1310-4.
20. Poobalan AS, Bruce J, King PM, et al. Chronic pain and quality of life following open inguinal hernia repair. Br J Surg. 2001;88:1122-6.
21. Callesen T, Bech K, Kehlet H. Prospective study of chronic pain after groin hernia repair. Br J Surg. 1999;86:1528-31.
22. Kosai N, Sutton PA, Evans J. Laparoscopic preperitoneal mesh repair using a novel self-adhesive mesh. J Minim Access Surg. 2011;7:192-4.
23. Smith AI, Royston CM, Sedman PC. Stapled and nonstapled laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair. A prospective randomized trial. Surg Endosc. 1999;13:804-6.
24. Tolver MA, Rosenberg J, Juul P. Randomized clinical trial of fibrin glue versus tacked fixation in laparoscopic groin hernia repair. Surg Endosc. 2013;27:2727-33.
25. Brugger L, Bloesch M, Ipaktchi R. Objective hypoesthesia and pain after transabdominal preperitoneal hernioplasty: a prospective, randomized study comparing tissue adhesive versus spiral tacks. Surg Endosc. 2012:26:1079-85.
26. Subwongcharoen S, Ruksakul K. A randomized controlled trial of staple fixation versus N-butyl-2cyanoacrylate fixation in laparoscopic inguinal hernia repair. J Med Assoc Thai. 2013;96:8-13.
27. Pommergaard HC, Burcharth J, Andresen K, Fenger AQ, Rosenberg J. No difference in sexual dysfunction after transabdominal preperitoneal (TAPP) approach for inguinal hernia with fibrin sealant or tacks for mesh fixation. Surgical endoscopy. 2017;31(2):661-6.
28. Bringman S, Conze J, Cuccurullo D. Hernia repair: the search for ideal meshes. Hernia. 2010;14:81-7.
29. Weyhe D, Belyaev O, Müller C, Meurer K, Bauer KH, Papapostolou G, et al. Improving outcomes in hernia repair by the use of light meshes- a comparison of different implant constructions based on a critical appraisal of the literature. World J Surg. 2007;31(1):234-44.

Cite this article as: Hamada T, Adachi T, Matsushima H, Moriuchi H, Iwata T, Eguchi S. Evaluation of chronic pain after transabdominal preperitoneal hernia repair. Int Surg J 2018;5:778-83.