



THE THAI JOURNAL OF SURGERY

Official Publication of The Royal College of Surgeons of Thailand

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The Thai Journal of Surgery is the official publication of The Royal College of Surgeons of Thailand and is issued quarterly.

The Thai Journal of Surgery invites concise original articles in clinical and experimental surgery, surgical education, surgical history, surgical techniques, and devices, as well as review articles in surgery and related fields. Papers in basic science and translational medicine related to surgery are also welcome.

Aim & Scope

The Thai Journal of Surgery is dedicated to serving the needs of the members of The Royal College of Surgeons of Thailand, specifically the younger researchers and surgical trainees who wish to have an outlet for their research endeavors. The Royal College strives to encourage and help develop Thai Surgeons to become competent researchers in all their chosen fields. With an international outlook, The Thai Journal of Surgery welcomes submissions from outside of Thailand as well.

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References must be listed on a separate sheet in numeric order as referred to in the article, not alphabetically. A simplified Vancouver system is used. Only references mentioned in the text should be listed and should be selective with no more than 30 references except under unusual circumstances. Number references consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by Arabic numerals (in superscript). The references must be verified by the author(s) against the original documents. Example forms of references are given below.

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List all authors when three or less; when four or more, list only the first three and add et al.

- o Soter NA, Wasserman SI, Austen KF. Cold urticaria: release into the circulation of histamine and eosinophil chemotactic factor of anaphylaxis during cold challenge. N Engl J Med 1976; 294:687- 90.

2. Corporate Author:

- o The Committee on Enzymes of the Scandinavian Society for Clinical Chemistry and Clinical Physiology. Recommended method for the determination of gamma glutamyltransferase in blood. Scand J Clin Lab Invest 1976; 36:119-25.
- o American Medical Association Department of Drugs. AMA drug evaluations. 3rd ed. Littleton: Publishing Sciences Group, 1977.

3. Personal Author(s):

- o Osler AG. Complement: mechanisms and functions. Englewood Cliffs: Prentice - Hall, 1976.

4. Editor, Compiler, Chairman as Author:

- o Rhoades AJ, Van Rooyen CE, comps. Textbook of virology: for students and practitioners of medicine and the other health

sciences. 5th ed. Baltimore: Williams & Wilkins, 1968.

5. Chapter in a Book:

- o Weinstein L, Swartz MN. Pathogenic properties of invading microorganisms. In: Sodeman WA Jr. Sodeman WA, eds. Pathologic physiology: mechanism of disease. Philadelphia: WB Saunders, 1974:457-72.

6. Agency Publication:

- o National Center for Health Statistics. Acute conditions: incidence and associated disability, United States, July 1968-June 1969. Rockville, Md.: National Center for Health statistics, 1972. Vital and health statistics. Series 10: Data from the National Health Survey, No. 69: (DHEW publication no. (HSM) 72-1036).

7. Newspaper Article:

- o Shaffer RA. Advances in chemistry are starting to unlock mysteries of the brain: discoveries could help cure alcoholism and insomnia, explain mental illness. How the messengers work. Wall Street Journal 1977 Aug 12:(col. 1), 10(col.1).

8. Magazine Article:

- o Roueche B. Annals of medicine: the Santa Claus culture. The New Yorker 1971 Sep 4:66-81. 9.

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An article can be referenced using only the DOI for electronic Journals and online articles or the DOI can be used in addition to standard referencing to print articles.

- o Chirappapha P, Arunnart M, Lertsithichai P, et al. Evaluation the effect of preserving intercostobrachial nerve in axillary dissection for breast cancer patient. Gland Surg 2019. doi:10.21037/gs.2019.10.06.
- o Chirappapha P, Arunnart M, Lertsithichai P, et al. Evaluation the effect of preserving intercostobrachial nerve in axillary dissection for breast cancer patient. Gland Surg 2019;8:599-608. doi:10.21037/gs.2019.10.06.

Abbreviations

Use only standard abbreviations of commonly used approved abbreviations. Avoid abbreviations in the title. The full term for which an abbreviation stands should precede its first use in the text unless it is a standard unit of measurement.

Statistics

All statistical analyses and the statistical software used must be concisely described. Descriptive statistics for quantitative variables must include an appropriate central tendency measure (e.g., mean or median) as well as a corresponding measure of spread (e.g., standard deviation or range or interquartile range). Categorical variables must be summarized in terms of frequency (counts) and percentage for each category. Ordinal variables can be summarized in terms of frequency and percentage, or as quantitative variables when appropriate. Statistical tests must be named and p-values provided to 3 decimal places. P-values less than 0.001 should be written "< 0.001" and p-values approaching 1 should be written "0.999".

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Randomized controlled trials should be analyzed using the intention-to-treat principle, and as treated analysis should be applied as well if there are significant cross-overs. Further details of statistical issues are available here (<http://www.icmje.org/icmje-recommendations.pdf>).

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(see Format <https://bit.ly/3IaP4ZB>)

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Use the common format. Emphasis is on clinician comprehension. The **Abstract** uses the same common structured format. In the **Main text**, the **Introduction**, in addition to the usual context setting and rationale, should also contain explanations and descriptions of basic science concepts at the level of the educated layman. The **Methods** section should still be concise with sufficient detail for others to replicate the experiment, but one or two paragraphs in between explaining basic processes in plain English would be helpful. In the **Results** section, similar conciseness is still the rule, but a brief simplified summary of the findings should be provided. In the **Discussion**, clinical implications should be clearly stated. The **Conclusion**, again, should answer the research question.

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We encourage publication of case series or case reports if a comprehensive review of the literature is included, with the aim of helping the clinician manage rare and challenging diseases or conditions based on best available evidence in conjunction with practical, local experience. For the Thai Journal of Surgery, this implies that the case report format differs somewhat from that of the common format for research articles.

Abstract: Need not be structured. State objective of the case presentation, present a summary of the case, the outcome and learning points in one concise paragraph.

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The **Conclusion** simply summarizes the case in terms of management implications.

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Abstract: A brief description of aims and content is sufficient.

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Editorial

Potchavit Aphinives, MD

Editor-in-Chief of The Thai Journal of Surgery

Happy Thai New Year, which is known as the Songkran festival worldwide. This grand festival is held on 13th -15th April every year. It is one of the most joyous events in the whole country. Many people travel back to their hometowns to meet beloved relatives. However, it also brings tragic car accidents, resulting in hundreds of casualties and thousands of injuries. We hope all readers have a smooth journey and happy family life during this festival and the whole year.

In the first issue of 2024, we proudly present four interesting case reports from Japanese and Thai hospitals, including two CVT and two trauma cases. Another article is about patient-care innovation in Lamphun province, Northern Thailand.

Last year, we published 20 original articles and sadly rejected 2 manuscripts (rejection rate 9.1%). We encourage all readers to contribute their experiences and works to our journal. Under the Thailand Hospital Accreditation System, all hospitals developed many care plans that can easily convert to one practical research type, known as Routine-to-Research (R2R). Not only are these useful for their hospital services, but they also benefit individual knowledge enlightenment.

Lastly, I emphasize the significance of ethical approval, which is required for each study, including the case report. We cannot publish any manuscript without authoritative ethical approval.

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Review Article

Comparison of Procaine and Lidocaine in Cardioplegia for Preventing Ventricular Fibrillation After Aortic Cross-Clamping Release in Coronary Artery Bypass Graft

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Abstract

Background: The use of Procaine hydrochloride in cardioplegia has been discontinued due to challenges importing the product from outside the country despite its crucial role in preserving myocardium during heart surgery. However, Lidocaine hydrochloride, an anti-arrhythmic medication, functions similarly to Procaine hydrochloride. Both medications are compared regarding their effectiveness in preventing ventricular fibrillation, the most common type of heart arrhythmia, after releasing the aortic cross-clamp in cardiac surgery.

Materials and Methods: This is a retrospective study in which data was collected from medical records of patients who were operated on with coronary artery bypass grafts between May 2017 and August 2023. Patient demographics and early outcomes between the two groups were analyzed.

Results: A total of 328 patients who underwent CABG were divided into 2 groups, respectively. Group “P” received cardioplegia solutions with Procaine hydrochloride, whilst group “L” received cardioplegia solutions with Lidocaine hydrochloride. The average age of the participants was 64.19 years old in group P and 64.24 years old in group L. The duration of the aortic cross-clamp was significantly different between the two groups, with durations of 76.06 minutes and 87.79 minutes, respectively, showing a *p*-value of less than 0.01 in statistical analysis. Following the release of aortic cross-clamping, the occurrence of ventricular fibrillation was observed in 37 patients (43%) in the first group and 49 patients (56.9%) in the second group, with no significant difference noted. After defibrillation at 10 joules, there were 21 patients (24.4%) in the first group and 13 patients (15.1%) in the second group, indicating a significant difference. Additionally, no significant difference was observed in the duration of the CCU stay between both groups.

Conclusion: Cardioplegic solution containing Lidocaine hydrochloride provides the same clinical result as Procaine hydrochloride in coronary artery bypass grafting surgery.

Keywords: Coronary artery bypass graft, Lidocaine hydrochloride, Procaine hydrochloride, Ventricular fibrillation

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INTRODUCTION

Coronary artery disease (CAD) is a common heart condition where a narrowing of the coronary artery has been partially or entirely blocked, causing insufficient delivery of blood to the heart. There are alternative management strategies to reduce the risk of further problems, commonly involving medication and lifestyle modification. However, once the patient has developed a tolerance to medication, surgical correction and coronary artery bypass grafts (CABG) should be the next consideration for physicians.¹

Arrhythmias and ventricular fibrillation (VF) likely occur after cardiac surgery, which has a deteriorating impact on mortality and morbidity rates.^{2,3} Research has shown a correlation between the incidence of ventricular fibrillation and the ischemic time of the heart after an aortic cross-clamp has been removed. Therefore, we rely on the cardioplegic solution to play an essential role in protecting the myocardium during the operation.⁴ Several additives, such as beta-blockers and calcium blockers, can be used to prevent arrhythmia after aortic declamp.⁵ Lidocaine and Procaine hydrochloride are additives used in cardioplegic solutions to induce cardiac arrest. They work by reducing extracellular sodium levels, thereby depriving the cells of the sodium needed for action potential. Additionally, they help stabilize the cell membrane and maintain a small amount of extracellular potassium, facilitating the restoration of heart rhythm following ischemic periods.^{4,6} In addition, the risk of seizure as a complication of Lidocaine toxicity is particularly concerning for patients undergoing cardiac surgery because postoperative seizure in cardiac patients is a known independent risk factor for permanent neurologic deficits and operative mortality.⁷

Procaine hydrochloride, which was used in cardioplegia, has been discontinued for import from outside the country. As a result, many cardiology centers in Thailand have developed their cardioplegia solution in hospitals, where Lidocaine Hydrochloride is an anti-arrhythmic medicine that works in the same way as Procaine Hydrochloride.⁸

In this study, we studied the prevalence of ventricular fibrillation by using Lidocaine hydrochloride and Procaine hydrochloride in cardioplegia reagents to determine if there is an arrhythmia after the release of an aortic cross-clamp. Also, we investigated the complications that may occur during and after surgery.

MATERIALS AND METHODS

Ethical committee approval was obtained from the Maharat Nakhon Ratchasima Hospital Institutional Review Board (090/2023). After informed consent, since this is a retrospective study, data from three hundred and twenty-eight patients who underwent CABG and were divided into two groups was collected retrospectively from May 9th, 2017, to August 25th, 2023, to study the incidence of cardiac arrhythmia after the removal of artery clamping in arrest reagents combined with Procaine hydrochloride and Lidocaine hydrochloride.

The primary outcome was ventricular fibrillation (VF) after aortic cross-clamping release. Secondary outcomes were defibrillation requirement, use of the temporary pacemaker, intra-aortic balloon pump, creatinine values, intubate time, and 30-day hospital mortality.

DATA COLLECTION

The authors collected demographic data, echocardiographic data, cardiopulmonary bypass time, aortic cross-clamp time, cardiac arrhythmia post-aortic clamp off, Number of defibrillations, inotropic drug support duration transfers, cardiac care unit stay, hospital stay, and lastly, in-hospital mortality from the medical records.

SURGICAL TECHNIQUE

All patients were operated on under standard CPB after median sternotomy and aortic arterial and two-stage right atrial venous cannulation with mild to moderate hypothermia (temperature 32–34 °C). Cold-blood cardioplegia was used for myocardial protection. Antegrade cardioplegia was given. At this stage, patients in Group P were administered cardioplegia containing Procaine hydrochloride, initially at a dose of 20 cc/kg, followed by a maintenance dose of 10 cc/kg every 20 minutes. Patients in Group L received cardioplegia with Lidocaine hydrochloride, administered at the same initial and maintenance doses. The heart was vented through the aortic root, followed by clamping of the ascending aorta. Subsequently, distal anastomosis of coronary artery bypass grafts was performed, followed by the completion of aortocoronary bypass under a double clamp technique. Once rewarming was completed, cardiopulmonary bypass was discontinued, and decannulation was performed, along with checking for bleeding points and placement of drains. Finally, the chest was closed, and the patient was transferred to the cardiac critical care unit.

STATISTICAL ANALYSIS

The data were analyzed using SPSS version 29.0. Continuous variables were reported as mean \pm standard deviation and compared using the independent sample t-test. Categorical variables were reported as frequency and percentage of the total group and compared using the chi-square test. All p -values ≤ 0.05 were considered significant.

RESULTS

A total of 328 patients were studied: 164 in cardioplegia solution with Procaine hydrochloride (group P) and 164 in cardioplegia solution with Lidocaine hydrochloride (group L). No statistically significant difference was determined between the groups regarding diabetes mellitus, hypertension, and ejection fraction over 40% ($p = 0.50, 0.60$, and 0.16 , respectively) (Table 1).

Table 1 Baseline patients' characteristics

Factor	Cardioplegia			p -value
	All	Group P	Group L	
Mean age; mean \pm SD	64.44 \pm 8.8	64.19 \pm 8.20	64.24 \pm 10.6	0.963
Male gender; n (%)	227 (69.2)	110 (67)	117 (71.3)	0.402
Comorbid; n (%)				
DM	153 (46.6)	73 (44.5)	79 (48.1)	0.506
HT	291 (88.7)	144 (87.8)	147 (89.6)	0.602
Laboratory finding; mean \pm SD				
EF	48.33 \pm 15.96	49.40 \pm 15.89	46.93 \pm 16.40	0.166
Creatinine	1.65 \pm 6.59	2.24 \pm 12.01	3.01 \pm 15.92	0.622
Creatinine Clearance	58.76 \pm 26.98	58.15 \pm 27.13	59.08 \pm 27.26	0.757
NYHA; n (%)				
Class I	27 (8.2)	12 (7.3)	15 (9.1)	0.547
Class II	230 (70.1)	116 (70.7)	114 (69.5)	0.809
Class III	66 (20.1)	33 (20.1)	33 (20.1)	1
Class IV	5 (1.5)	3 (1.8)	2 (1.2)	0.652

The duration of cardiopulmonary bypass time showed an insignificant difference between groups (groups P 120.51 vs. groups L 145.81 minutes). However, the period of aortic clamping significantly differed in both groups (groups P 76.07 vs. groups L 87.79 minutes) at $P < 0.01$. There was no difference in ventricular fibrillation occurrence after the aortic clamping was released between groups (groups P 22.6% vs. groups L 29.9%). The defibrillation results (10 joules) of the ECG returned to normal and showed that the difference between groups was statistically significant (group P 24.4% vs. group L 15.1%; $p = 0.005$). and defibrillation greater than 10 joules in group P (18.6%) was lower than in group L (41.9%), and the difference between the two groups was statistically significant ($p = 0.005$). There was no significant difference in the number of defibrillations between groups (groups P = 0.35 vs. groups L = 0.46), respectively. There was also no significant difference in

bradycardia between groups (groups P 1.8% vs. groups L 4.3%). With the dysfunctional heart patients who were eligible for an intra-aortic balloon pump, there was no significant difference between groups (groups P 1.8% vs. groups L 4.9%). The use of inotropic medication during the transfer of both groups showed no significant difference (groups P 56.7% vs. groups L 53.7%), respectively (Table 2).

There was no significant difference in intubation periods between groups (groups P 2.25 vs. groups L 2.31 days). after being discharged from the cardiac operating room to the cardiac care unit (CCU). Creatinine levels after surgery did not increase as much between groups (groups P 1.15 vs. groups L 1.56 mg/dl). There was no significant difference in CCU stay between groups (groups P 7.48 vs. groups L 6.61 day) or the proportion of patients within 30-day mortality rates between groups (groups P 6.1% vs. groups L 6.1%) (Table 3).

Table 2 Variables and indicators related to arrhythmia during surgery in the two studied groups

Factor		Cardioplegia		p-value
	All	With Procaine	With Lidocaine	
Operate; n (%)				
CABG x 2	14 (4.3)	7 (4.3)	7 (4.3)	1
CABG x 3	116 (35.4)	56 (34.1)	60 (36.6)	0.644
CABG x 4	181 (55.2)	93 (56.7)	88 (53.7)	0.579
CABG x 5	17 (5.2)	8 (4.9)	9 (5.5)	0.803
Bypass time; mean ± SD	133.68 ± 85.45	120 ± 29.58	145.81 ± 116.41	0.07
Aortic cross-clamp time; mean ± SD	82.21 ± 21.52	76.07 ± 17.92	87.79 ± 24.04	< 0.01
VT/VT; n (%)	86 (26.3)	37 (22.6)	49 (29.9)	0.123
Defibrillation; n (%)	86 (26.3)	37 (22.6)	49 (29.9)	0.123
Defibrillation 10 Joule	34 (39.5)	21 (24.4)	13 (15.1)	0.005
Defibrillation > 10 Joule	52 (60.5)	16 (18.6)	36 (41.9)	0.005
Number of defibrillation	0.41 ± 0.84	0.35 ± 0.75	0.46 ± 0.91	0.265
Anesthesia uses drugs; n (%)				
Lidocaine hydrochloride	42 (12.8)	17 (10.4)	25 (15.2)	0.186
Cordarone	6 (1.8)	1 (0.6)	5 (3)	0.099
Magnesium sulfate	12 (3.7)	4 (2.4)	8 (4.9)	0.239
Temporary pacemaker; n (%)	10 (3)	3 (1.8)	7 (4.3)	0.199
Intra-aortic balloon pump (IABP); n (%)	11 (3.4)	3 (1.8)	8 (4.9)	0.125
Inotropic drug during transfer; n (%)	249 (75.9)	114 (69.5)	135 (82.3)	0.07

Table 3 Postoperative parameters and outcomes

Factor		Cardioplegia With Procaine	With Lidocaine	p-value
	All			
Intubate time (day); mean ± SD	2.28 ± 3.79	2.25 ± 4.18	2.31 ± 3.38	0.873
Laboratory finding: mean ± SD				
Creatinine day 1	1.36 ± 3.85	1.15 ± 0.95	1.56 ± 5.3	0.336
Creatinine day 2	1.44 ± 1.17	1.46 ± 1.09	1.42 ± 1.26	0.748
CCU stay, day; mean ± SD	7.05 ± 7.55	7.48 ± 8.86	6.61 ± 5.97	0.297
Hospital stays, day; mean ± SD	12.23 ± 12	12.11 ± 14.47	12.34 ± 8.9	0.862
30 days in hospital mortality; n (%)	20 (6.1)	10 (6.1)	10 (6.1)	1

SD: standard deviation, DM: diabetes mellitus, HT: hypertension, EF: ejection fraction, NYHA: New York Heart Association, CABG: coronary artery bypass graft, VT: ventricular tachycardia, VF: ventricular fibrillation, CCU: critical care unit, IQR: interquartile range

DISCUSSION

Cardiac arrhythmias are one of the most common complications after open heart surgery and are an important factor in mortality and morbidity.^{2,9} The incidence of post-operative ventricular arrhythmias may range from 1.8% to 13%.¹⁰ Ventricular fibrillation status and attempts for treatment by internal defibrillation may injure the myocardium during reperfusion.¹¹ Lidocaine affects the

sodium channels and decreases late depolarization. By increasing the diastolic electric current, shock works as an anti-arrhythmic agent.¹² Procaine hydrochloride is also a local anesthetic agent that may have an antiarrhythmic role and has a similar action mechanism to Lidocaine.

Therefore, a cardioplegic solution is used to prevent myocardial damage and develop its protection, and choosing a cardioplegic solution is important in this regard.^{2,13}

The cardioplegic solution protects the myocardium against ischemia and events during reperfusion.⁴ Lidocaine and Procaine hydrochloride are two additives commonly included in cardioplegic solutions. These agents function by reducing extracellular sodium levels, thereby inducing cardiac arrest by depriving the heart of the sodium needed for action potential generation. Additionally, they facilitate a small increase in extracellular potassium, aiding in stabilizing cell membranes. This mechanism helps restore normal heart rhythm following periods of ischemia.^{4,6}

In the recent investigation, no significant difference was noted between the two groups regarding the spontaneous return to sinus rhythm after declamping. However, the group treated with Procaine hydrochloride showed a higher rate of spontaneous return. Additionally, there was a notable decrease in the need for Lidocaine, cordarone, magnesium, and inotropic drugs during transfers for sinus rhythm in the Procaine hydrochloride group. These results mirror those found in Sellevold's study,⁶ which compared the effectiveness of two cardioplegic solutions – one containing 1 mM Procaine hydrochloride and the other 0.9% normal sodium in the Lidocaine group. Sellevold's research focused on the occurrence of ventricular fibrillation after aortic declamping and the potential of Procaine hydrochloride to reduce such incidents post-declamping. In our study, the percentage of ventricular arrhythmias between the two groups was 10%–24%, and there was no significant difference between the two groups regarding the occurrence of ventricular arrhythmias.¹⁴ Previous studies have explored that Lidocaine causes a reversible, concentration-dependent increase in the energy requirements for successful defibrillation.¹⁵ Previously published studies have evaluated the effects of Lidocaine hydrochloride and Procaine hydrochloride in cardioplegia. There was no variation in postoperative kidney function between the two groups that resulted in acute kidney injury.¹⁶

Despite the fact that Procaine hydrochloride in cardiac arrest reagents has been extensively investigated and that arrhythmia following aortic clamping has not varied drastically, it was determined to continue coronary artery bypass surgery.

LIMITATIONS

This retrospective observational study cannot control past relevant variables and data collected from a single

center; therefore, it cannot be used to represent most of the population. Coronary heart disease is a life-threatening condition, sometimes concomitant with valvular heart disease. There were only 328 cases over the seven-year recording period, so extending the data collection time to allow a broader population may impact the results that differ from prior research, such as demographic characteristics, surgical teams, and patient care patterns. This study compared fibrillation following aorta clamping to Procaine hydrochloride and lidocaine hydrochloride in a cardioplegia solution that required comparable environmental variables as feasible. Different circumstances may vary over time, resulting in comparable unpredictability.

CONCLUSION

Lidocaine can be an alternative agent for Procaine hydrochloride with a similar incidence of ventricular fibrillation.

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Delay Traumatic Chylothorax after Gunshot: A Case Report

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Abstract

Background: Chylothorax is the occurrence of chyle in the pleural space due to damage or obstruction of the thoracic duct. Its etiology can be traumatic or nontraumatic. If left untreated, chylothorax may yield an overall 50% mortality rate.

Objective: To present a case of chylothorax secondary to a gunshot lesion as well as to review current concepts about chylothorax and its treatment.

Materials and Methods: Case report: A 22-year-old Thai man who complaint progressive chest pain and dyspnea on exertion for two weeks after being discharged from a traumatic gunshot with right hemothorax after treatment with pleural drainage and retained gunshot at left lower lung. Cardiovascular examination revealed normal. Chest examination revealed decreased breath sound at the right thorax. The chest X-ray (CXR) showed a massive pleural effusion. Management was based on pleural drainage and pleural fluid analysis to confirm the diagnosis of chylothorax.

Results: Our patient underwent pleural drainage and fasting for about 1 week with parenteral nutrition but failed conservative treatment. Surgical treatment becomes an option in this case. We approached video assisted right minithoracotomy in identifying and ligating the thoracic duct and performed a surgical pleurectomy of the right thorax. Post-operative, the flow rate through pleural drainage decreased, and pleural fluid characteristics were changed to serum fluid. CXR showed no pleural effusion. The patient was discharged from the hospital 1 week after surgery.

Conclusion: In this case report, we emphasize the late traumatic chylothorax after the gunshot. Chylothorax requires a high index of clinical suspicion for diagnosis. This case report demonstrates that timely and appropriate treatment is essential to prevent associated complications.

Keywords: Chylothorax, Traumatic chylothorax, Gunshot

INTRODUCTION

Chylothorax is the occurrence of chyle in the pleural space due to damage or obstruction of the thoracic duct. Its etiology can be traumatic or nontraumatic.

The term traumatic is often used to include both iatrogenic and postinjury chylothoraces, which usually represent the most common causes of significant chyle accumulation in the chest.

In a recent report from the Mayo Clinic, the cause

was surgery or trauma in 50% of the patients, medical conditions in 44%, and unknown in 6%.

If left untreated, chylothorax may yield an overall 50% mortality rate.

Biochemically, chyle is usually characterized by a content of triglycerides in the pleural fluid greater than that detected in the plasma (> 110 mg/dL), a cholesterol/triglycerides ratio less than 1, and the presence of chylomicrons.

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Three approaches to managing chylothorax are

1. Conservative (nonsurgical); (1) nothing per oral (NPO); (2) medium-chain triglyceride diet; or (3) parenteral nutrition.

2. Surgical, aimed at identifying and isolating the lymphatic duct causing the leak so it can be closed.

3. Surgical, aimed at obliterating the space otherwise to be filled by chyle.

We report the presentation and management of a case of chylothorax secondary to a gunshot lesion, as well as review current concepts about chylothorax and its treatment.

CASE PRESENTATION

A 22-year-old Thai man with no underlying disease who complaint progressive chest pain and dyspnea on

exertion for two weeks after being discharged from a traumatic gunshot with right hemothorax after treatment with pleural drainage and retained gunshot at left lower lung. He has no current medication. A cardiovascular examination revealed that his heart rhythm was regular. Chest examination revealed decreased breath sound at the right thorax. The results of an examination of other systems were normal.

Chest X-ray (CXR) showed a right massive pleural effusion with a retained gunshot in the left lower lung (Figure 1A). Our patient underwent pleural drainage, and pleural effusion was milky, about 4 liters, with no smell (Figure 1B). We sent pleural fluid to confirm the diagnosis. After right intercostal drainage (Rt. ICD), Chest computed tomography (CT chest) was sent for evaluation (Figure 1C).



Figure 1 A: CXR on admission, B: Pleural fluid on admission, C: CT chest after on Rt. ICD

The results of lab investigations

- Triglycerides in the pleural fluid: 2,834 (> 110 mg/dL)
- Cholesterol/ triglycerides ratio less than 1: 0.13 (367/2834)

The result of CT chest: hyperattenuation right pleural effusion (Ddx; hemothorax, chylothorax) with

compressive right lower lobe atelectasis, a large metallic fragment at left lower lung without bony fracture, great vessel, cardiac or esophageal injury.

Our patient underwent pleural drainage and fasting for about 1 week with parenteral nutrition but failed conservative treatment (Figure 2).

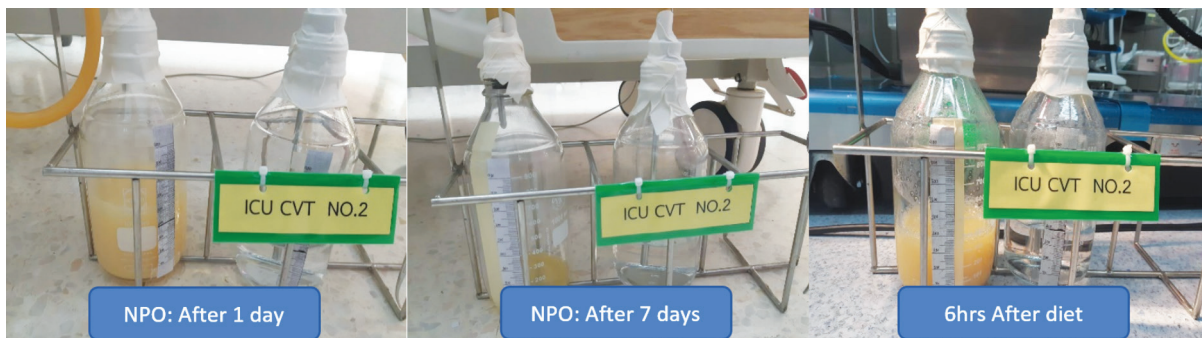


Figure 2 Pleural fluid after conservative treatment

Surgical treatment becomes an option in this case. We approached video assisted right minithoracotomy, to identify and ligate the thoracic duct (Figure 3) and performed surgical pleurectomy of the right thorax and intra-operative medical pleurodesis with TALC.

Post-operative, the flow rate through pleural drainage decreased, and pleural fluid characteristics were changed to serum fluid (Figure 4).

CXR showed no pleural effusion (Figure 5). The patient was discharged from the hospital 1 week after surgery.

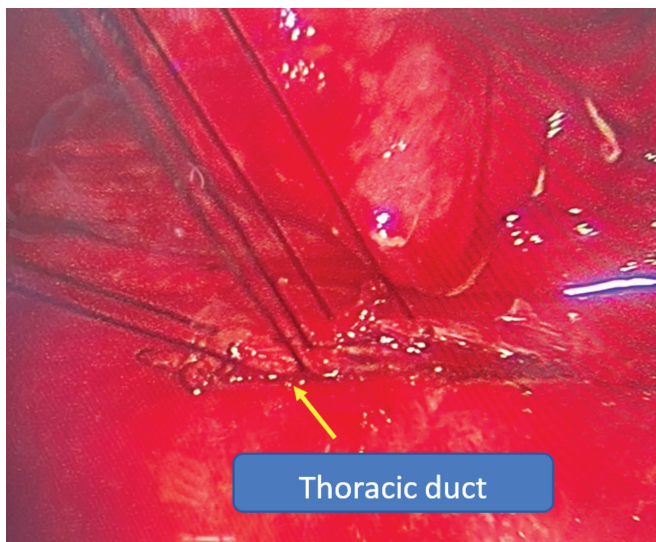


Figure 3 Intra-operative thoracic duct ligation

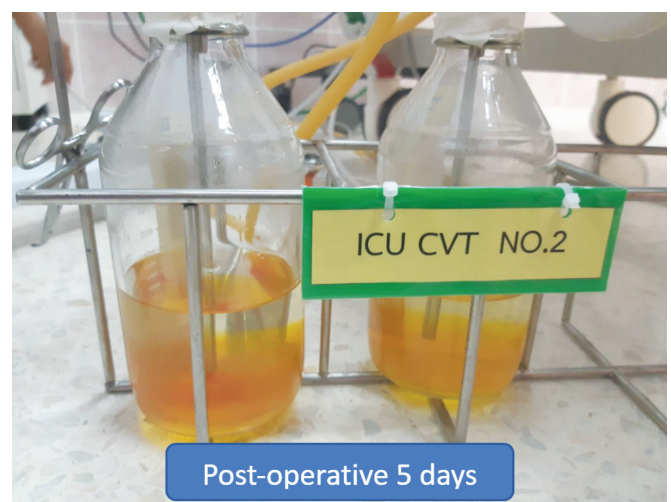


Figure 4 Pleural fluid (post-operative)



Figure 5 CXR (Post-operative)

DISCUSSION

Chylothorax is a rare condition. Chylothorax of traumatic origin may be an early or late complication after an accident. It usually presents itself 7-10 days after the trauma.

Three approaches to managing chylothorax are:

1. Conservative (nonsurgical): (1) nothing per oral (NPO), (2) medium-chain triglyceride diet, or (3) parenteral nutrition.
2. Surgical, aimed at identifying and isolating the lymphatic duct causing the leak so it can be closed.
3. Surgical, aimed at obliterating the space otherwise to be filled by chyle.

In adults, it has been suggested that the detection of recurrent chylothorax greater than 1 liter/day after 1 week is evidence of failure of conservative management.

In this case, our patient underwent pleural drainage and fasting for about 1 week with parenteral nutrition but failed conservative treatment. Surgical management will be considered.

CONCLUSION

In this case report, we emphasize the late traumatic chylothorax after the gunshot. Chylothorax requires a high index of clinical suspicion for diagnosis. This case report demonstrates that timely and appropriate treatment is essential to prevent associated complications.

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Felt Sandwich Exclusion for Apical Multiple Muscular Ventricular Septal Defects

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Abstract

Background and Objective: Apical multiple muscular ventricular septal defects (VSDs) are difficult to visualize, and closing these VSDs is technically troublesome. For these reasons, the surgical outcome of the lesion is unsatisfactory. Some surgical techniques have been reported to improve the outcome, but they are not definitive.

Case presentation: We present a 5-month-old infant diagnosed with atrial septal defect (ASD) and multiple muscular and perimembranous VSDs. Pulmonary hypertension (PH) due to high pulmonary blood flow was also observed. Symptoms of this patient were dyspnea and poor weight gain. The surgical treatment was needed for the patient. In the first operation during the infantile period, the patient received closure of the perimembranous and muscular VSDs through the right atrium. ASD closure was also performed. However, postoperative pulmonary blood flow was not decreased compared with that before the operation, and PH was not improved. In addition to these lesions, tricuspid valve insufficiency was also observed after the operation. Postoperative computed tomography (CT) showed channels of apical muscular VSDs in the apex of the right ventricle. Surgical re-intervention was planned to reduce pulmonary blood flow. In the second operation, the exclusion of apex muscular VSDs using the felt sandwich exclusion technique and tricuspid valve repair was performed. After closing multiple muscular VSDs during the operation, pulmonary blood flow was significantly decreased, and PH was improved as well. After the second operation, postoperative echocardiography and catheter examination showed decreased VSD shunt and reduced pulmonary blood flow, resulting in improved PH.

Conclusion: Felt sandwich exclusion for apical multiple muscular ventricular septal defects may be one of the surgical options for apical muscular ventricular septal defects.

Keywords: Congenital heart disease, Acyanotic heart disease, Multiple ventricular septal defects

INTRODUCTION

Surgical treatment for apical muscular ventricular septal defects (VSDs) remains challenging because there are many variations in the location of the VSDs. It is also hard to visualize these VSDs, and the optimal procedure for closing VSD should be adopted. Closing muscular VSD using the transatrial approach through the tricuspid valve may be difficult, especially in small-body patients. Some surgical closing techniques for the VSDs, including the felt septal sandwich technique and direct closure

through the right ventriculotomy, have been reported, but the outcomes of these techniques for the lesion are also not definitive.¹⁻³ In this report, we present the clinical case of a patient who received effective surgical treatment for apical muscular VSDs.

CASE PRESENTATION

A 5-month-old girl with symptoms of tachypnea and poor weight gain who weighed 4.98 kg had been diagnosed with perimembranous and small muscular

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VSDs, atrial septal defect (ASD), and pulmonary hypertension (PH) due to high pulmonary blood flow. Prior to the surgery, there was a small muscular VSD, and shunt flow through the muscular VSD was estimated little in the preoperative echocardiographic image. This patient received transarterial VSDs closure, both perimembranous and muscular, as well as ASD closure. However, residual muscular VSDs were revealed, and catheter examination showed Q_p/Q_s of 2.4 and sustained PH after the first operation. By closing perimembranous VSD, ventricular blood shunt flow through the muscular VSDs increased, which was not distinct before the first operation, and PH was persistent. The second surgical procedure to control pulmonary blood flow was mandatory. Apical muscular VSDs exclusion closure was planned as a second operation almost 2 months after the first operation. Before the surgery, we estimated the location of the VSDs channels

in the cardiac apex using CT (Figure 1) and localized the part of the exclusion area during the surgery. In the second operation, we established cardiopulmonary bypass (CPB). On the beating heart, the location of apical muscular VSDs was estimated depending on the esophageal echocardiographic image. The cardiac apex was squeezed with forceps, and the disappearance of the VSDs shunt was confirmed in the esophageal echocardiographic image. After a cardiac arrest was obtained in the routine method. Through the right atriotomy, VSD closure was tried. The apical muscular VSDs were not visualized via a tricuspid valve, and closing the VSDs through the right atrium was technically impossible. To exclude the muscular VSDs, we performed the felt sandwich exclusion technique on the cardiac apex where channels of VSDs were located (Figure 2).

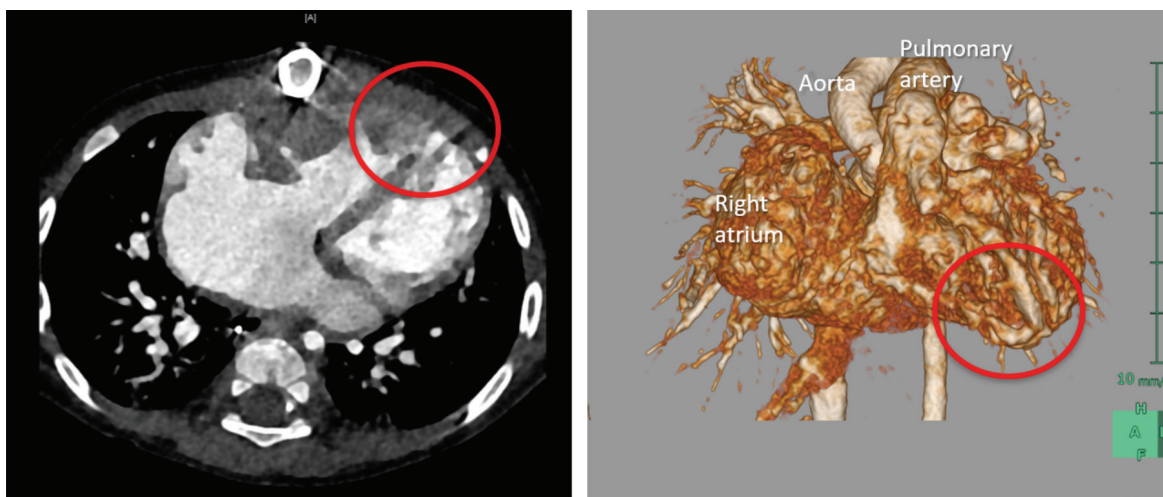


Figure 1 Computed tomography image showing the channels of the muscular ventricular septal defects in the apex of the right ventricle (red circle)

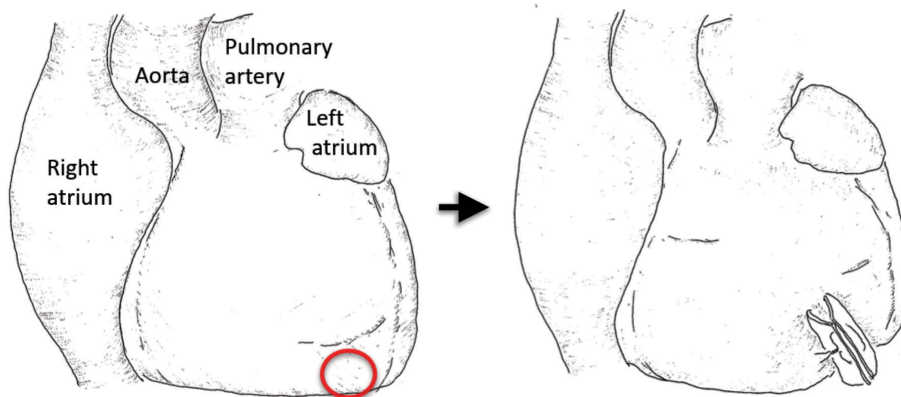


Figure 2 Cardiac apex (red circle) was excluded using the felt sandwich technique to close the VSD channels near the apex

Two felts (10 mm × 10 mm in size) were sutured with 3-0 polypropylene suture (needle size 31 mm) to exclude the place that was estimated before cardiac arrest by esophageal echocardiography. The stitch was placed 15 mm in depth on the cardiac apex. The tricuspid valve was repaired, and then. After aortic de-clamping, normal heart rhythm was obtained, and weaning from CPB was uneventful. Transesophageal echocardiography after weaning from CPB showed a reduced trans-apical muscular VSDs shunt as compared with that presented before the closure of VSDs and reduced tricuspid regurgitation. After the patient was weaned from CPB, Qp/Qs was less

than 1.2, and pulmonary banding was not necessary. The postoperative course was uneventful, and the patient was discharged from the hospital without any complications. Postoperative echocardiography showed a tiny muscular VSD shunt (Figure 3), mild pulmonary hypertension estimated by echocardiography, and good ventricular function, and postoperative catheter examination 1 year after the second surgery showed a Qp/Qs of 1.02 and mild PH, in which the ratio of pulmonary arterial pressure to systemic pressure was 0.4. The patient was placed on anti-pulmonary hypertensive medication.

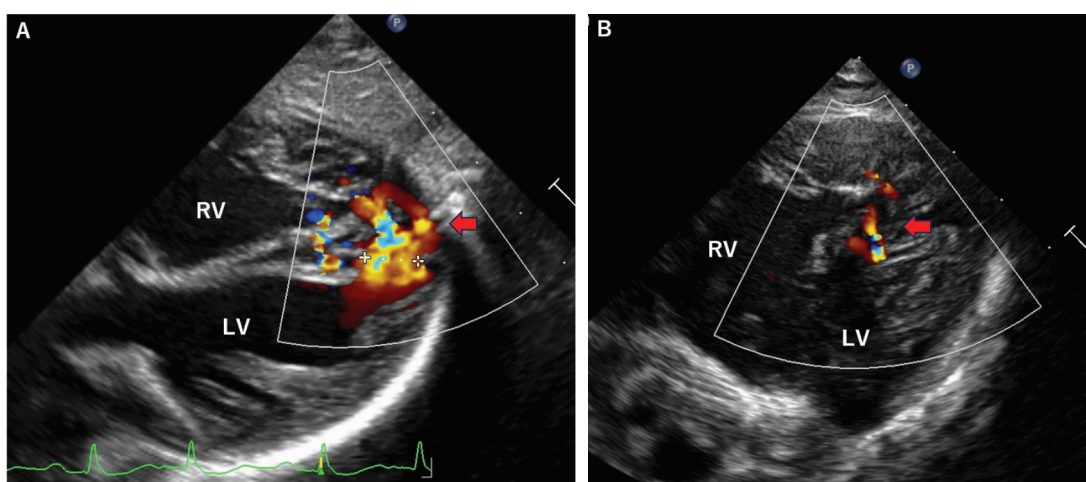


Figure 3 Pre (A) and post (B) operative echocardiographic image. The width of apical VSDs shunt flow (red arrow) was decreased postoperatively

DISCUSSION

The optimal diagnosis and treatment of muscular VSDs remains indeterminate. Muscular VSDs exist on various parts of the ventricular septum, and it is hard to visualize the VSD channel in the coarse trabeculations of the right ventricle, not only on preoperative images but also via direct vision during the operation. Furthermore, shunt flow through apical muscular VSDs could not be clearly visualized in patients with multiple VSDs, as was the case in our case. However, CT images obtained before the operation are useful as a reference. In our case, a surgical strategy of apical VSDs sandwich exclusion could be planned while referring to the preoperative image.

Although some surgical approaches, including intraoperative device closure,⁴ the ventricle septal sandwich technique, and direct closure through right ventriculotomy, have been reported, optimal outcomes have not

yet been obtained. Device-related complications such as device embolization, tricuspid or aortic valve damage, and recurrent defects may occur, and in our country, device closure of VSD is not comfortable. The ventricle septal sandwich technique is effective; however, the use of numerous felt patches on the ventricular septum disturbs its movement of the ventricular septum, resulting in impairing ventricular function.² In addition to surgical techniques, visualization of muscular VSDs is an important factor for the treatment during the surgery. Apical right or left ventriculotomy has been used to visualize the apical muscular VSDs for closure,⁵ but ventriculotomy might lead to late ventricular dysfunction, aneurysmal formation, and ventricular arrhythmias in the future due to surgical scar of the ventricle.

Because muscular VSDs can be located anywhere on the ventricular septum, a definitive surgical closure

method cannot be established. The choice of surgical technique should be based on the place where the VSDs are located. For the patient with Swiss-cheese VSDs felt sandwich technique could be useful,² and for the patient with VSDs, which could not be closed surgically, pulmonary artery banding should be chosen, expecting natural closure of VSDs or future single ventricle circulation. In determining the best surgical technique, it is important to determine preoperatively where the VSD channels are. In our presented case, preoperative CT image was useful for locating the VSDs and which channels were near the ventricular apex, and these VSDs were to be excluded by using the felt sandwich technique exteriorly.

CONCLUSIONS

Although our felt sandwich exclusion technique is not suitable for VSDs in the base side of the ventricular septum and is not a standard option, this technique may be one of the choices for surgical closure of apical muscular VSDs.

The Institutional Review Board in our institute has reviewed this case report and approved publication, and informed consent has been obtained from the patient's family.

LIST OF ABBREVIATION

PH : Pulmonary hypertension
VSD : Ventricular septal defect
ASD : Atrial septal defect
CT : Computed tomography
CPB : Cardiopulmonary bypass

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Immediate Exploration of The Traumatic Abdominal Wall Disruption in Children: A Case Report

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Abstract

Background: Traumatic abdominal wall disruption in children is a rare but severe diagnosis resulting from blunt abdominal trauma (BAT). The clinical diagnosis is not usually straightforward, and the hernia is often discovered at the time of the surgical exploration for intra-abdominal injuries or by imaging studies.

Presentation of Case: A 13-year-old boy, a restrained male patient, was the victim of a high-speed road traffic accident. Among other injuries, he showed bruising over the lower abdomen and localized right-side peritonitis upon presentation. A contrast-enhanced computed tomography scan of the chest and abdomen demonstrated abdominal wall muscular disruption over the right lower quadrant with herniation of the large bowel. The patients had immediate exploratory laparotomy with hernia repair.

Discussion: Traumatic abdominal wall disruption is a rare form of hernia caused by abdominal wall musculature and fascia disruption. The diagnostic criteria and classification of traumatic abdominal wall disruption are still unclear; furthermore, the ideal timing and method of surgical treatment are still unclear. Herein, we report a case of traumatic abdominal wall disruption and describe the surgical approach used.

Conclusion: Children with traumatic abdominal wall disruption have high rates of concomitant abdominal organ injury requiring operative repair. CT scans have low sensitivity and specificity for detecting associated injuries. A high suspicion of injury and low threshold for exploration must be maintained in traumatic abdominal wall disruption cases.

Keywords: Traumatic abdominal wall injury, Abdominal wall hernia, Pediatric

INTRODUCTION

Traumatic abdominal wall disruption is a highly uncommon form of the hernia that is caused by disruption of the abdominal wall musculature and fascia (while the skin is still intact) and bowel and abdominal organ herniation following blunt abdominal trauma. Since 1906, when Selby¹ reported the first case of traumatic abdominal wall hernia (TAWH), around 140 cases of TAWH (including both case reports and case series) have been reported in the English-language medical literature.

The incidence of acute posttraumatic hernia, which is rarely encountered in clinical practice, has been estimated at 0.07%.² This is despite the high incidence of

abdominal trauma as presented to the emergency department. Historically, there is a low threshold for urgent explorative laparotomy for the management of TAWH because of its strong association with intraabdominal injury.³ However, with the increasing accuracy of modern computed tomography (CT) in diagnosing visceral injuries and increasing practice for conservative management of solid organ injuries, there is an argument for managing traumatic abdominal wall disruption conservatively. With few cases reported, the literature has not established a consensus on diagnosis and management. We also report our experience with a case of traumatic abdominal wall disruption and discuss a clinical approach in light of

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the literature findings. Associations were made between diagnostic findings and grading of traumatic abdominal wall disruption, with the need for urgent surgery.

CASE REPORT

A 13-year-old boy was transferred to our hospital after sustaining a motorcycle accident. He arrived at the emergency department at our hospital, with the paramedics, in a stable condition. He was assessed along the lines of the Advanced Trauma Life Support (ATLS) protocol. The patient sustained multiple injuries. The Glasgow Coma Scale (GCS) was 15 at presentation and tachycardia (heart rate 112 beats per minute). He showed, upon assessment, the following positive signs: left periorbital swelling, tenderness over the right thigh, and shortening limb of the right lower extremities. During examination of his abdomen, patchy ecchymoses, bruises, and skin maceration over the right lower abdomen and pelvis. The examination, otherwise, showed a soft abdomen with moderate lower abdominal tenderness and bilateral, mildly tender, being more prominent on the right side (Figure 1). The focused assessment with sonography in trauma (FAST) exam showed positive at hepatorenal and cul-de-sac regions (Figure 2).



Figure 1 Abdominal wall contusion

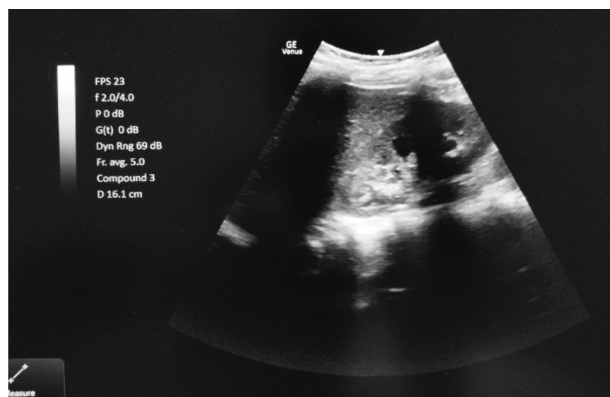


Figure 2 Positive FAST at the hepatorenal region

A contrast-enhanced CT scan of the abdomen shows disrupting all the layers of muscular defects involving the anterior abdominal wall, being more marked on the right lower abdomen associated with subcutaneous visceral herniation with the ileocecal area being present in the defect. Subcutaneous fat stranding and bleeding could be identified over the anterior sheath. Present intraperitoneal free fluid at the perihepatic, pelvic cavity and inter-bowel loop were detected on a CT scan. No free peritoneal air could be found. The liver and spleen were unremarkable (Figure 3-4).

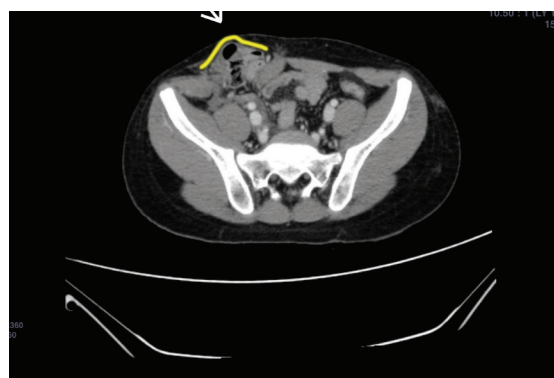


Figure 3 Abdominal wall defect (Axial)



Figure 4 Abdominal wall defect (Sagittal)

The patient immediately underwent exploratory laparotomy through an upper to mid-midline incision. Inferior to the umbilicus, a moderate amount of hemoperitoneum was encountered; however, no enteric contents were appreciated. Duodenal hematoma and non-expanding right retroperitoneal hematoma were detected during abdominal exploration. The cecal serosal split was closed with an interrupted 4-0 absorbable suture (Figure 5). Appendectomy was performed by standard double ligate technique (due to the difficult diagnosis of appendicitis in the future).

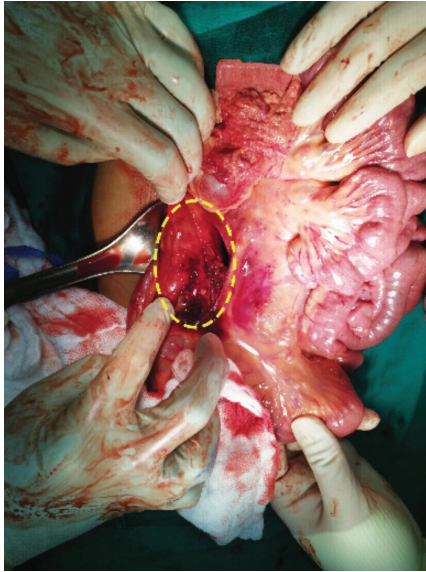


Figure 5 Mesenteric defect

Due to the risk of abdominal cavity infection during abdominal wall repair, the double-layer repair technique treated the abdominal disruption (**Figure 6**).



Figure 6 Repair external oblique aponeurosis

The patient remained extubated and monitored in the intensive care unit for 3 days. He was discharged 7 days after the initial trauma. We designed the following patient one year after operation (**Figure 7**).



Figure 7 No detect abdominal wall defect during follow-up in the first year

The outline of management, which would include diagnosis, management, and long-term complications, was discussed with the patient.

DISCUSSION

The mechanism of injury for traumatic abdominal wall disruption usually involves a sudden application of a large force to a small area of the abdomen, resulting in the disruption of the deeper tissue of the muscle and fascia with or without skin involvement.⁴ The tangential shearing stresses associated with a sudden elevation in intra-abdominal pressure are thought to be the basic injury mechanism.

The disruptions tend to occur more commonly at anatomic weak points, such as the lateral border of the rectus, lower abdomen, inguinal region, or natural orifices.⁵ In our case, the abdominal wall defect was located vertically over the lower abdomen, in the region of the linear semilunaris—an area of weakness where the posterior rectus sheath is deficient. Traumatic disruptions are dramatic injuries that may dominate clinicians' attention in the emergency room. However, there are often associated injuries due to the significant force that is imparted. Associated injuries may be present in up to 30% of cases.⁶ These injuries require prompt surgical attention. While resuscitation proceeds, a rapid secondary survey should be performed to identify polytrauma injuries. After stabilization, these patients should be taken to the operating room.

Given the rarity of traumatic abdominal wall disruption, accurate diagnosis of both the abdominal wall hernia and associated injuries is challenging. CT scan has gained popularity as the diagnostic modality of choice due to its perceived ability to detect the defect as well as associated intrabdominal injury.

Our studies found that CT scans detected most traumatic abdominal wall disruptions where physical examination fell short, yet operative intervention was more likely dependent on clinical factors, such as worsening examination despite otherwise nonspecific or negative CT scan findings. This supports the need to keep a high index of suspicion for injury requiring operative intervention, with serial examination and monitoring with special attention to concern for the evolution of intraabdominal organ injury.

While the presence of this traumatic abdominal wall disruption was highly associated with a concurrent intrabdominal injury needing intervention, we found that CT scans were poor predictors of concomitant abdominal organ injury despite the presence of traumatic abdominal wall disruption and nonspecific findings such as abdominal free fluid.

With the combination of poor predictability and high incidence of concomitant abdominal organ injury, we advocate for early exploration, within the first 2 to 24 hours of arrival, in children suffering traumatic abdominal wall hernia in order to evaluate for a concomitant abdominal organ injury that may warrant urgent operative attention while also managing the hernia.

A careful search should be carried out for associated injuries at exploratory laparotomy. The abdominal wall laceration should be debrided and then repaired in layers. However, when there is marked edema, significant tissue injury, and/or an unstable patient, abdominal wall closure becomes less important, and a staged closure would be more appropriate.⁷ We did not believe this was required in the index case as there was little tissue loss after debridement, and the abdominal wall tissues were healthy. Therefore, we could achieve a tension-free fascial closure, and the skin closed primarily.

As for the treatment of this hernia type, this could be emergent or elective. Concerning the timing of repair, there was no significant difference between repair at initial trauma laparotomy or in an elective setting during hospitalization. Factors affecting the timing (early or delayed) and the type (primary or prosthetic, open

or laparoscopic) of the repair include the following: the extent of concomitant findings, presence of associated intra- and extra-abdominal lesions, size of the abdominal wall defect, the timing of its diagnosis.⁸

In case the trauma patient is stable and the size of the hernia is small, with the visceral organs protruding through the defect, exploratory laparotomy/laparoscopy should be performed on an urgent basis to prevent possible visceral incarceration.⁹

In cases when the traumatic abdominal wall disruption is discovered during abdominal exploration for visceral injury repair, the decision to repair the hernia may be more challenging and depends on multiple factors, including the physiological stability of the trauma patient to withstand such a procedure in an emergency setting, the size of the orifice and the risk of incarceration, the presence of abdominal contamination from hollow viscus injury, the ability to perform a tension-free primary repair or alternatively the possible need of prosthetic material with the risk of surgical infection.⁹ Noting that the use of biological mesh in the case of contamination may prove to be a good alternative despite less favorable long-term durability.¹⁰ In cases where the abdominal wall defect is large and urgent surgical exploration of the abdomen is not indicated, the repair can be delayed, giving appropriate time for the skin to heal and for any associated injuries to recover. However, this delay would be at the expense of the hernia itself, which will enlarge due to muscle retraction and atrophy, resulting in a more challenging repair, making primary repair more difficult, and increasing the chances of resultant abdominal compartment syndrome.¹¹

CONCLUSION

Children with traumatic abdominal wall hernia confirm the rare incidence of this diagnosis. In our studies, these hernias are most commonly due to motor vehicle accidents followed by blunt abdominal trauma and are associated with high rates of concurrent intrabdominal injuries that necessitate operative management. While traumatic abdominal wall disruption is detected readily on CT scans, there is a low sensitivity and specificity in detecting these concurrent injuries. The presence of a traumatic abdominal wall disruption should key the clinician to the coexistence of commonly missed diagnoses, such as injuries to the bowel, mesentery, and pancreas. Therefore, a high index of suspicion for associated intrabdominal injury should be maintained, with a low threshold for

operative exploration and careful ongoing monitoring for evidence of delayed progression of additional injuries.

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The Result of Proactive Colorectal Cancer Screening in Lamphun Province

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Abstract

Background: Colorectal cancer is a highly common cancer and is the cause of death in the world and Thailand. Researcher and leader of the team developing the cancer service system developed a proactive colorectal cancer screening in Lamphun Province 2018 - 2022.

Objective: To study the results of proactive colorectal cancer screening in Lamphun Province.

Materials and Methods: This retrospective study is designed to examine the results of proactive colorectal cancer screening using the FIT, which was considered the first investigation and confirmed by colonoscopy. The target group is the general public aged 50 -70, and the data is analyzed using descriptive statistics.

Results: The results of the proactive screening for colorectal cancer use a fecal immunochemistry test (FIT) cut of 100 ng/ml. Screening by providing services at nearby hospitals when FIT results are positive; registering the colonoscopy appointment on Google Sheets; and performing bowel preparation at the community hospital. Proactive screening found that we were able to screen patients thoroughly in each area, which is not different. Compared with research statistics, there is no statistical significance; the p-value is 0.288. It shows that colorectal cancer screening services are accessible to all areas, even in remote areas, and results from colonoscopy found colonic polyps at 32.09% and cancer at 1.13%. Relevant medical personnel agree that proactive screening methods in Lamphun Province should be used as a standard approach for colorectal cancer screening.

Conclusion: This study demonstrated that proactive colorectal cancer screening has been adjusted from initial screening with the FIT and colonoscopy appointment system. Bowel preparation system. Suitable for the context of Lamphun Province.

Keywords: FIT, Colorectal cancer screening, Colonoscopy

INTRODUCTION

Colorectal cancer is a common cancer. It is the third most common cancer in males after liver and bile duct cancer and lung cancer, and the second most common cancer in females after breast cancer. Colorectal cancer is a disease that is a significant problem. It is the cause of death for the world's population, including in Thailand.¹ Risk factors for developing colorectal cancer include personal factors such as gender, age, family history of cancer, healthy behaviors, consumption of pork, beef, and high-fat foods, drinking alcohol, smoking, having a

BMI above the standard, and being at risk for colorectal cancer.^{2,3} There are several methods for screening for colorectal cancer, such as detection of blood in the stool (FIT), colonoscopy, flexible sigmoidoscopy combined with double contrast barium enema, and computed tomography colonoscopy^{4,6} which found that cancer screening can reduce the incidence.⁶ In the early stages of colorectal cancer, there are usually no symptoms. The symptoms of colorectal cancer include blood in the stool, abdominal pain, bowel habit changes such as constipation alternating with diarrhea, and the stool

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becoming smaller. Detecting cancer at an early stage and treating it will result in good treatment. Colonic polyps are precancerous lesions that can develop into cancer. The detection and removal of polyps can reduce the development of colorectal cancer. Colonic polyps are abnormal growths of the colonic mucosa, divided into many types. Some types of polyps may not change until they become colon cancer, such as hyperplastic polyps, inflammatory polyps, and pseudopolyps. However, some types are at risk of changing to become colon cancer, such as adenomatous polyp, sessile serrated adenoma, and traditional serrated adenoma, detected by colonoscopy and rectal examination.⁷⁻⁹

Surgery department Lamphun Hospital has developed a care system for colorectal cancer patients. Including the development of a service system. In the past, colorectal cancer screening was provided at Lamphun Hospital when patients with abnormal symptoms came to see the doctor and suspected that they had colorectal cancer. The importance of developing proactive colorectal cancer screening using the FIT as a preliminary screening is that the examination is simple and convenient, can be performed in every area, the examination cost is not high, and screening costs can be reimbursed according to universal coverage of Thailand^{8,10} and confirmation by colonoscopy for the general public, precisely those aged 50 to 70.⁸ Effectively and as a standard guideline for colorectal cancer screening in Lamphun Province.

MATERIALS AND METHODS

This retrospective study examined the results of proactive colorectal cancer screening using the FIT, which was considered the first investigation and confirmed by colonoscopy. The study was conducted between 2018 and 2022. The data collection location is the chemotherapy unit at Lamphun Hospital. Network Community Hospital Lamphun hospitals include Li Hospital, Ban Hong Hospital, Pa Sang Hospital, Ban Thi Hospital, Wiang Nong Long Hospital, Maetha Hospital, and Thung Hua Chang Hospital.

Inclusion criteria

Population age 50-70⁸; consent to undergo screening

Tools

Research tools developed by the researcher consist of

1. The general information record of network medical personnel providing colorectal cancer screening services includes gender, age, and length of service at the current unit. Training experience in caring for patients with colorectal cancer (use the topic to create a Google Form).

2. Record the patient satisfaction questionnaire with services. Topics include gender, age, and area of residence. The answers are open-ended, and overall satisfaction with service was measured using a Likert scale that measures satisfaction on five levels.

3. Record the possibility of colorectal cancer screening. There are scores from 1 to 5, including actual practice in the work context, convenience, effectiveness of practice, and overall satisfaction.

4. Record the target group data: Lamphun Hospital number, identification number, name-surname, telephone number, date of birth, address, medical benefits scheme, sub-district, service unit number, and colonoscopy appointment date and time. (Use the topic to create a Google Form.) The answers are open-ended.

5. The record form for indicators consists of topics. Total number of target groups, Number of target groups screened with a FIT. Results of screening with a FIT. Number of target groups that need colonoscopy. The number of target groups that actually do colonoscopy and colonoscopy results.

Inspection of tool quality

1. Checking the quality of the tools (content validity) is as follows: General information record of network medical personnel, Record the patient satisfaction questionnaire. Record the possibility of colorectal cancer screening, the form for target group data, and the form for indicators. To be checked for content validity by inspection by 3 experts: 2 medical professors and 1 surgical specialist to check the appropriateness of the language used. Clarity of questions Then improve according to suggestions.

2. Checking the tool's confidence (reliability): The researcher inspected the feasibility recording tool for proactive colorectal cancer screening confidence. The researcher tested it on a group of samples with similar characteristics. The sample group studied is 1. doctors and 2. professional nurses to improve before use. Clarity of language and understanding of the sample group.

Methods

Proactive colorectal cancer screening is underway in Lamphun Province. Select a FIT cut of 100 ng/ml (hemoglobin cut-off concentration of 100 ng/ml). Proactive screening involves providing services at a nearby hospital. If the FIT results are negative, make an appointment for repeat testing every year. If the FIT results are positive, prepare the patient by going to the lab. Register for the colonoscopy appointment system on Google Sheets. Next, the pharmacist at Lamphun Hospital coordinated the delivery of medicine to prepare the bowel. When the

appointment day arrived, the patient came for a colonoscopy at Lamphun Hospital.

Data analysis

The purpose of this study is to study the results of proactive colorectal cancer screening in Lamphun Province on the colorectal cancer screening rate in the group, target rate of discovery of bowel diseases, satisfaction of patients, and satisfaction of Lamphun Hospital network personnel in October 2017 - October 2022.

Table 1 Shows the number of samples screened according to area or treatment eligibility.

District	2561		2562		2563		2564		2565		Average (%)
	Screen	%	Screen	%	Screen	%	Screen	%	Screen	%	
Muang	3,370	85.96	3,400	78.88	2,524	90.6	1,971	67.04	379	11.21	66.74
Maeta	1,280	100	1,085	89.67	921	87.5	455	49.1	0	0	65.26
Ban Hong	1,114	91.31	1,288	96.84	866	76.1	959	97.86	551	48.76	82.17
Lee	670	42.22	1,639	93.66	1,070	64.4	1,335	90.82	1,331	78.76	73.97
Thung Hua Chang	402	96.87	460	100	437	98.6	388	98.23	339	74.51	93.64
Pasang	1,358	81.81	1,739	95.03	1,188	78.1	0	0	0	0	50.99
Banthi	450	80.36	620	100	371	74.5	415	94.32	503	99.60	89.76
Wiang Nong Long	447	84.34	363	62.59	320	61.2	191	42.44	399	77.48	65.61
Lamphun Municipality					192	100					
Sirivej					101	46.1			187	85.0	

The table shows the community hospital network. Thung Hua Chang Hospital has a continuous screening rate in the target group, accounting for an average

of 93.64%. In spite of being in the furthest area from the center of Lamphun Province,¹¹ people can access services.

Table 2 Shows a comparison of percentage differences in access to colorectal cancer screening services. One-way ANOVA at a confidence level of 95%.

	\bar{x}	SD	df	F	P-value
Network to access colorectal cancer screening services			7	1.286	0.2888
Muang	66.74	32.29			
Maeta	65.26	41.28			
BanHoong	82.17	20.60			
Lee	73.97	21.18			
Thung Hua Chang	93.64	10.75			
Pasang	51.00	46.98			
Banthi	89.76	11.66			
Wiang Nong Long	65.61	16.26			

The table shows that access to colorectal cancer screening in each area is not different. Compared with research statistics, there is no statistical significance;

the p -value is 0.288. It shows that colorectal cancer screening services are accessible in all areas, even in remote areas.

Table 3 Shows the results of the colorectal screening program.

Year	Target group that is also filtered FIT Quantity (%)	Screening results, as well FIT		Target group for colonoscopy Quantity (%)	Colonoscopy result		
		Positive Quantity (%)	Negative Quantity (%)		Malignancy Quantity (%)	Polyp Quantity (%)	Normal Quantity (%)
2018	9,091 (82.74)	214 (2.35)	8,877 (97.65)	144 (67.29)	3 (2.08)	44 (30.56)	97 (67.36)
2019	10,622 (87.86)	655 (6.16)	9,967 (93.83)	398 (60.76)	5 (1.26)	108 (27.14)	285 (71.61)
2020	7,993 (79.70)	586 (7.33)	7,407 (92.67)	508 (86.69)	4 (0.79)	169 (32.87)	335 (65.94)
Including the period before the epidemic	27,706 (83.67)	1,455 (2.25)	26,251 (94.75)	1,050 (72.16)	12 (1.14)	321 (30.57)	717 (68.29)
2021	5,714 (50.89)	522 (9.14)	5,192 (90.86)	288 (55.17)	3 (1.04)	104 (36.11)	181 (62.85)
2022	3,689 (28.57)	515 (13.96)	3,174 (86.04)	164 (31.85)	2 (1.22)	57 (34.76)	105 (64.02)
Including the period of the epidemic	9,403 (38.95)	1,037 (1.10)	8,366 (88.97)	452 (43.59)	5 (1.11)	161 (35.62)	286 (63.27)
Total	37,109 (64.82)	2,492 (6.67)	34,844 (93.33)	1,502 (60.27)	17 (1.13)	482 (32.09)	1,003 (66.78)

The table shows that screening coverage was high before the outbreak of the coronavirus in 2019, accounting for 83.67%. Screening results with FIT positives were calculated at 2.25%, confirmed by colonoscopy at 72.16%. Colonic polyps were found at 30.57%, and malignancy at 1.14%.

During the coronavirus outbreak, screening coverage was reduced by 38.9%. FIT-positive screening results were 1.10% in all screened patients who confirmed an appointment. Colonoscopy accounted for 43.59%. Colonic polyps were found at 35.62% and malignancy at 1.11%.

Table 4 Shows the colorectal cancer screening rates in the target group. The discovery rate of intestinal and rectal diseases includes malignant polyps.

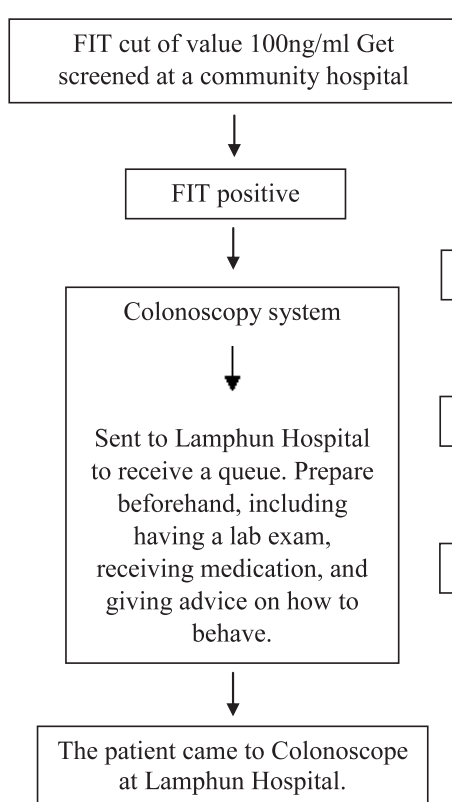
Topic	2018	2019	2020	2021	2022
Colorectal cancer screening rates in target groups	82.74	87.86	79.70	50.89	28.57
Rate of discovery of intestinal and rectal diseases					
Malignant	2.08	1.26	0.79	1.04	1.22
Polyp	30.56	27.14	32.87	36.11	34.76

From the table, it is found that during the situation before the outbreak of the coronavirus in 2019, operations were smooth, and screening had a good trend, but at the end of the year 2020, an outbreak of the coronavirus in 2019, colorectal cancer screening rates in the target group decreased accordingly. The rate of discovery of colon and rectal diseases, including cancer, is not high, but the discovery and removal of polyps in the colon that may have changed into colon cancer has good results and still maintains the level. The screening was satisfactory.

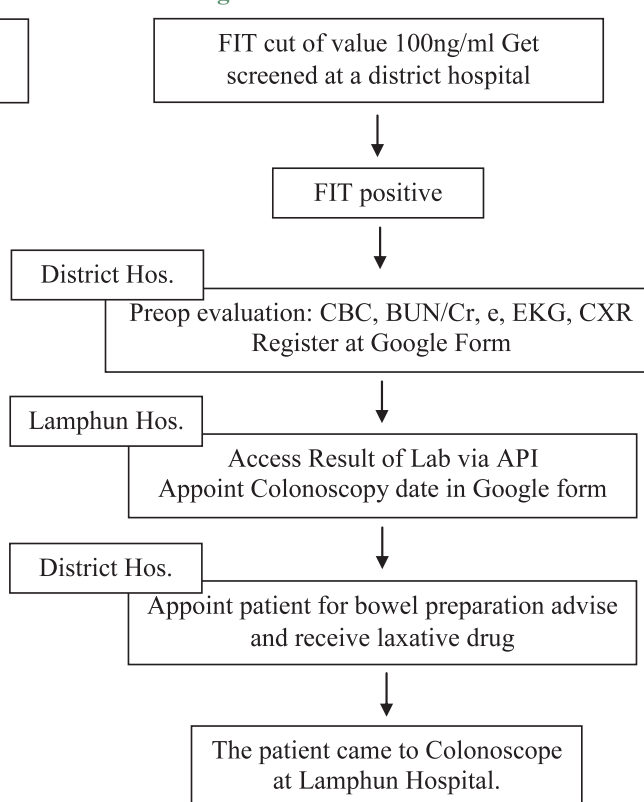
LESSON LEARNED

From the situation of the spread of coronavirus in 2019, it has been found that using technology to help in the process can reduce the chance of exposure and spread of infection. It is also very convenient for medical personnel. Access to the service can be done anywhere, including an internet network. Reduce waiting to receive service. Reduce congestion in the hospitals. As a result, service recipients do not have to lose both time and travel expenses. Therefore, operations are planned to be consistent with the situation as follows:

Before the outbreak of coronavirus 2019



During the outbreak of coronavirus 2019



Satisfaction of patients

Patients' overall satisfaction with the proactive colorectal cancer screening service was 94.67%.

Satisfaction of Lamphun Hospital network personnel

Personnel in the network believe that proactive colorectal cancer screening appropriate to actual practice in the work context accounts for 94%, convenience for 95%, effectiveness for 97%, and overall satisfaction for 93%.

RESULTS

Proactive colorectal cancer screening is underway in Lamphun Province. Select a FIT cut of 100 ng/ml. Proactive screening involves providing services at a nearby hospital. When FIT results are negative, make an appointment for repeat testing every year. If FIT results are positive, the patient is prepared for preoperative evaluation. Register for the colonoscopy appointment system on Google Sheets. When the doctor who performed the colonoscopy checked the lab results, and they were normal, he issued an appointment queue. The pharmacist at

Lamphun Hospital coordinated the delivery of medicine to prepare the bowel. When the appointment day arrived, the patient came for a colonoscopy at Lamphun Hospital.

Patient side

The results of the screening found that the rate of discovery of colon and rectal diseases, including cancer, was not high. The discovery and removal of polyps in the large intestine that may have changed to become colon cancer had good results when using the FIT cut of 100 ng/ml, consistent with Marut's study. Wattanawongwiboon in 2019,¹⁰ where the study examined the predictive value of positive results and the population that must be admitted to the gastrointestinal endoscopy unit. When screening for colon cancer with FIT 50 compared to FIT 100 in Nakhon Pathom Hospital, the results of the study found that colon cancer screening using FIT 100 ng/ml has a lower number needed to colonoscope and a lower positive rate and dropout rate than FIT 50 ng/ml; therefore, it is a screening method. appropriate for countries with personnel limitations and equipment for gastrointestinal endoscopy.

CONCLUSION

This study was able to demonstrate that proactive colorectal cancer screening has been adjusted from initial screening with the FIT and colonoscopy appointment system. Bowel preparation system. Suitable for the context of Lamphun Province. It should be used as a standard approach for colorectal cancer screening in Lamphun Province.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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