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About the Journal

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.

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2. Corporate Author:

- 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.
- American Medical Association Department of Drugs. AMA drug evaluations. 3rd ed. Littleton: Publishing Sciences Group, 1977.

3. Personal Author(s):

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

4. Editor, Compiler, Chairman as Author:

- Rhooder 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: mechanisme 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-June1969. 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 inso mnia, explain mental illness. How trhe 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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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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Authors are advised that the Thai Journal of Surgery adheres to standards set by the International Committee of Medical Journal Editors (ICMJE) and the Committee on Publication Ethics (COPE). Reporting guidelines that authors should consult and follow include the CONSORT Guidelines for randomized controlled trials; PRISMA Guidelines for systematic reviews and meta-analyses of randomized controlled trials, MOOSE Guidelines for systematic reviews, and meta-analysis of observational studies; STROBE Guidelines for observational studies; and ARRIVE Guidelines for animal research. Details of these and other guidelines can be obtained from https://www.equator-network.org/reporting-guidelines/.

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

Abstract: should be no more than 300 words in length, and written in a structured format, including the following headings: **Objective,** which can include some background material of 1 to 2 sentences in length, but mainly describing the research question; **Methods,** concisely describing the research design and data procurement; **Results,** describing the main findings of the study; and **Conclusion,** which should concisely answer the research question, and no more. Below the abstract, a list of keywords should be provided.

Main text: should be written in a structured format, including the following headings. **Introduction** should describe the rationale of the study within the context of current knowledge; the gap in knowledge with which the research study will fill must be clearly pointed out and a research question explicitly stated. **Methods (and patients, if applicable)** should clearly describe the details of research methodology and patient or research volunteer recruitment according to Guidelines for each type of research as listed above (…), and how the data was collected and analyzed. A short description of statistics used, and the software and references if appropriate, must be provided. A note on Ethics Committee approval, if applicable, must be given. **Results** should include data or summaries of patient or volunteer characteristics, summaries of risk factors or covariates and outcomes, presented in tabular, graphical or descriptions in the text as appropriate, without significantly duplicating one another. Results of statistical analyses must be clearly displayed and should include point estimates, standard errors, statistical tests, *p*-values, and 95% confidence intervals as detailed (…). Analyses not shown but

referred to must not change the conclusions or outcomes. **Discussion,** which must fully describe the implications of the research results, should include a concise literature review of previous published, related results. These related results must be compared with those of the authors' study, and the differences clearly stated along with plausible explanations. New unexpected findings, especially from subgroup analyses or those for which the research was not designed, should be considered hypothetical and stated as such. Any plausible, relevant clinical application should be indicated. Finally, any significant limitations of the study must be mentioned and possible extensions of research should be briefly provided. **Conclusion,** which should be concerned with answering the research question posed by the current study, should not be summarizing results of previous studies or recommendations. An **Acknowledgement** section can be added at the end of the article. The Reference list should be in the format as described previously.

Basic Science and Translational Research

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.

Main text: An **Introduction** is required to set the importance or relevance of the case within the current clinical context, based on a comprehensive literature review. A brief review of anatomy and pathology, or pathophysiology can be provided. **Report of the case** then follows with sufficient details on clinical presentation, diagnostic work up, interesting features, and decision making, to be useful for other surgeons. Surgical management should be concisely described and should be accompanied by high-resolution photographs or high-quality drawings and diagrams, if possible. Unique features of the case, and typical or general features should be distinguished. **Results** of management and follow-up information should be provided. **Discussion** then places the clinical, diagnostic, surgical and pathological features of the case within current knowledge or context and provides reasons for decision making and surgical management or otherwise. Wider implications of the case should be emphasized; for example, when management contradicts existing guidelines or when feasibility of some never-before performed surgery has been demonstrated. The **Conclusion** simply summarizes the case in terms of management implications.

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Special articles are often solicited and may have no standard structure. But some structure will aid understanding or entice readers.

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Original Article

Cost-Analysis of Inguinal Herniorrhaphy under General Anesthesia in Same-Day Surgery

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Abstract

Background: Same-day Surgery (SDS) was the protocol that operated and discharged the patient on the same day. The benefits of SDS were decreasing crowdedness, decreasing waiting time, increasing the accessibility of medical services, and decreasing the cost of medical care. Several studies have shown herniorrhaphy under general anesthesia (GA) was safe and could be done in SDS. However, no studies evaluated the cost analysis of herniorrhaphy under GA in SDS specifically.

Objective: To compare the medical costs of herniorrhaphy under GA between SDS and traditional care from the hospital's perspective.

Methods: This study was a retrospective descriptive study. The medical chart of patients who was performed herniorrhaphy under GA at Songkhla Hospital over 5-year (2018-2022) was reviewed. The patients who had ASA class ≥ III, recurrent hernia, bilateral inguinal hernia, herniorrhaphy with an additional procedure, acute incarcerated hernia, and strangulated hernia were excluded from this study. Demographic data and direct medical costs were compared between the SDS group and the traditional group.

Results: 49 patients were recruited for this study. 25 patients in the traditional group and 24 patients in the SDS group. Two cases (8.3%) in the SDS group failed to discharge on the same day. The overall costs were significantly lower in the SDS group (6,081 Baht ± 712 vs 9,445 ± 3,499 Baht, Mean difference 3,246 Baht, $p > 0.001$). The length of stay was significantly shorter in the SDS group (0.31 ± 0.19 days vs 3.33 ± 2.13 days, Mean difference 3.11 days, $p > 0.001$). No significant difference in overall complications between both groups.

Subgroup analysis of patients without complication was shown the same result. The overall cost, total labor costs, and medication costs were still significantly lower in the SDS group. The material costs were significantly higher in the SDS group.

Conclusion: Herniorrhaphy under GA in same-day surgery had lower medical costs, shorter length of stay, and no difference in overall complications compared to traditional care.

Keywords: Cost-analysis, Same-day surgery, Herniorrhaphy, Under GA

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Introduction

Inguinal herniorrhaphy is one of the most common operations.[1] Inguinal hernia repair was developed into same-day surgery (SDS) that operated and discharged on the same day. The benefits of SDS were decreased crowding, decrease waiting time, increase the accessibility of medical services and decrease cost of medical care.[2]

SDS decreased the length of stay because the preoperative evaluation was done at the outpatient department (OPD) and postoperative observation was done at home. Compared to traditional care, the patient was admitted 1 day before surgery for preoperative evaluation and discharged the next day after surgery.

Several studies have shown herniorrhaphy under GA was safe and could be done in same-day surgery.[3] However, no studies evaluated the cost of herniorrhaphy under GA in same-day surgery specifically. This study took the hospital's perspective. The main objective of this study was to compare the medical costs of herniorrhaphy under GA between SDS and traditional care from the hospital's perspective.

Patients and Methods

This study was a retrospective descriptive study. The medical chart of patients who was performed herniorrhaphy at Songkhla Hospital over 5-year (2018-2022) was reviewed. All operations were done by one surgeon.

The inclusion criteria was the patients who had inguinal herniorrhaphy under GA. Exclusion criteria were ASA (American Society of Anesthesiologists) class ≥ III, recurrent hernia, bilateral inguinal hernia, herniorrhaphy with an additional procedure, acute incarcerated hernia, and strangulated hernia. Patients received the information and decided to participate in the traditional group or SDS group before surgery.

In the traditional group, Patients were admitted and preoperative evaluated at the ward one day before surgery. Patients were observed and discharged the next day after an operation if there were no postoperative complications. Discharge criteria consisted of a pain score < 4, no wound bleeding/hematoma, no scrotal swelling, and postoperative voiding was seen.

In the SDS group, preoperative evaluation was done at the pre-anesthetic clinic before the operative date. After surgery, patients were closely observed for 4 hours and discharged if no early postoperative complications. Discharge criteria were the same as the traditional group. Nurses telephoned the patient to evaluate pain symptoms and detected early complications at 24 hours and 72 hours after discharge.

The anesthetic technique was the same in both groups. Herniorrhaphy with the Lichtenstein technique was done in all patients by one surgeon. An oblique incision was done at the groin. Herniotomy was done, and the hernia sac was ligated using silk 2-0. Polypropylene mesh size 3 × 6 inches was placed on the inguinal floor. Mesh was fixed to the inguinal ligament and conjoint tendon using Polypropylene 2-0. The abdominal sheath was sutured using Polyglactin 2-0. The skin was closed using a skin stapler.

In both groups, patients have been prescribed home medication Acetaminophen, Ibuprofen, Tramadol, and Milk of magnesia if no contraindication and then follow-up at 2 weeks after surgery.

The demographic data, cost, operative time, length of stay, and early postoperative complications were compared between both groups.

This study took the hospital's perspective and focused on the short-term consequences. Only direct medical costs related to inpatient or same-day surgery were considered. This study did not include direct non-medical costs and indirect costs such as costs related to time use by patients and caregivers (assumed to be similar in the two surgical approaches), costs related to referral and diagnosis, meal costs, investment costs, and depreciation expense (also assumed to be similar for the two groups).

The direct medical costs were separated into operative costs, medication costs, and perioperative nursing costs. Operative costs consisted of intraoperative labor costs and material costs. Medication costs included the costs of preoperative drugs, anesthetic drugs, postoperative drugs, and home medications. Perioperative nursing costs included nursing labor costs.

The average income per month of medical personnel was calculated into labor cost per hour according to 20 working days per month and 7 working hours per day (actually 8 hours minus 1 hour of lunchtime). The labor cost of each activity was calculated using labor cost per hour multiplied by the working period.

The software SPSS, version 19 (IBM, USA) was used for statistical analysis. Categorical variables were compared using chi-square. The mean ± standard deviation (SD) was used in continuous variables. Continuous parameters were examined using independent samples T-test. Statistical significance was defined as p-value < 0.05.

Sample size was calculated according to the data from previous study.[4] 6 patients for each group were needed to achieve a power of 80% and a significance level of 5% to declare that the two groups have significant differences.

Results

49 patients were recruited for this study. 25 patients in the traditional group and 24 patients in the SDS group. All patients were male with primary inguinal hernia. Herniorrhaphy with the Lichtenstein technique under GA was performed in all patients. Average age and ASA classification were significantly lower in the SDS group (Table 1). The endotracheal tube was used in all patients except 8 patients in SDS group was used laryngeal mask airway.

The overall cost was significantly lower in the SDS group (6,081 ± 712 Baht vs 9,445 ± 3,499 Baht, Mean difference 3,246 Baht, $p > 0.001$). Total labor costs and medication costs were significantly lower in the SDS group. But material costs were significantly higher in the SDS group (Table 2).

Table 1 Demographic data

Demographic data	Traditional (n= 25)	SDS (n = 24)	*p*-value
Age, mean ± SD	60.84 ± 16.71	51.00 ± 16.29	0.04
Comorbidity, n (%)			
Diabetes	3 (12)	1 (4)	0.31
Hypertension	11 (44)	2 (8)	0.005
Dyslipidemia	5 (20)	2 (8)	0.24
Benign prostate hypertrophy	5 (20)	0 (0)	0.02
CVA	3 (12)	0 (0)	0.08
MI	1 (4)	1 (4)	0.98
Other	2 (8)	1 (4)	0.58
ASA class, n (%)			0.013
I	10 (40)	18 (75)	
II	15 (60)	6 (25)	

Table 2 Medical costs

Medical costs	Traditional	SDS	*p*-value
Labor costs, mean ± SD			
Intraoperative labor costs	3,720 ± 1,160	3,437 ± 635	0.20
Perioperative nursing costs	1,604 ± 1,085	98 ± 62	> 0.001
Total labor costs	5,392 ± 1,968	3,545 ± 641	> 0.001
Medication costs, mean ± SD	2,788 ± 1,719	726 ± 308	> 0.001
Material costs, mean ± SD	1,318 ± 266	1,753 ± 428	> 0.001
Overall costs, mean ± SD	9,445 ± 3,499	6,081 ± 712	> 0.001

The length of stay was significantly shorter in the SDS group (0.31 ± 0.19 days vs 3.33 ± 2.13 days, Mean difference 3.11 days, $p > 0.001$). No significant difference in operative time and overall complication between both groups. No patient loss followed up at 2 weeks after surgery. No readmission and early recurrent inguinal hernia in both groups.

In the SDS group, 2 cases (8.3%) failed to discharge on the same day. One patient had dyspnea after extubation and the surgeon's concern about postoperative wound complications in another patient who had a large inguinal hernia. However, all of them clinically improved and were discharged the next day (Table 3). No reoperation was seen in the SDS group.

Table 3 Postoperative outcome

Postoperative outcome	Traditional (n = 25)	SDS (n = 24)	*p*-value
Operative time (minutes), mean ± SD	58.50 ± 15.91	54.37 ± 11.33	0.38
Length of stay (day), mean ± SD	3.33 ± 2.13	0.31 ± 0.19	> 0.001
Post-operative complication, n (%)			
Hematoma	3 (12)	0 (0)	
Surgical site infection	1 (4)	0 (0)	
Severe post-op pain	1 (4)	0 (0)	
Dyspnea after extubation	0 (0)	1 (4)	
Overall complications	5 (20)	1 (4)	0.09

In the traditional group, 5 cases (20%) had postoperative complications. The postoperative hematoma was seen in 3 patients who had a large inguinal hernia. One of them reoperated for clot evacuation on postoperative day 3 and was admitted for 8 days. One patient had postoperative severe pain and was admitted for 4 days. A surgical site infection was detected at 2 weeks after surgery in one patient who was a prisoner. Incision and drainage were done and treated as an outpatient.

Subgroup analysis of patients without complication was shown in Table 4 (excluding 1 patient in the SDS group and 5 patients in the traditional group). The overall cost, total labor costs, and medication costs were still significantly lower in the SDS group. The material costs were significantly higher in the SDS group.

Table 4 Medical costs of patients without complication

Medical costs	Traditional	SDS	*p*-value
Labor costs, mean ± SD			
Intraoperative labor costs	3,641 ± 914	3,469 ± 639	0.18
Perioperative nursing costs	1,155 ± 216	90 ± 46	> 0.001
Total labor costs	4,797 ± 1,043	3,559 ± 136	> 0.001
Medication costs, mean ± SD	2,222 ± 1,066	731 ± 314	> 0.001
Material costs, mean ± SD	1,265 ± 30.5	1,774 ± 424	> 0.001
Overall costs, mean ± SD	8,283 ± 1,478	6,137 ± 671	> 0.001

Discussion

Inguinal hernia repair in same-day surgery (SDS) had benefits in decreasing crowdedness, decreasing waiting time, increasing the accessibility of medical services, and decreasing the cost of medical care. In this study, SDS had significantly lower overall costs compared to traditional care with a mean difference of 3,246 Baht.

This study had a selection bias causing a higher overall cost for the patient in the traditional group. The surgeon preferred traditional care for the patients who had high risks such as large inguinal hernia that high risk for postoperative wound complications, multiple comorbidities, high risk for anesthetic complications, underlying disease benign prostatic hyperplasia (BPH) that high risk for postoperative urinary retention. These factors caused higher average age, ASA class, length of stay, and postoperative complications.

Subgroup analysis of patients without complication was done for decreased the selection bias. However, overall costs were still lower in the SDS group

Total labor cost should be lower in the SDS group because the lower length of stay caused decreasing perioperative nursing costs. Medical costs should be lower in the SDS group because patients in the traditional group had higher comorbidity and higher average operative time. However, material costs were a little bit higher in

the SDS group because laryngeal mask airway was used in some cases in the SDS group.

The result of this study was following with a previous study, Hantanyapong N. studied about cost-effective of pediatric One Day Surgery in indirect inguinal hernia and hydrocele in 61 patients.[4] The average total costs were lower in one-day surgery cases compared to admitted cases (6,475 Baht vs 8,213 Baht, $p < 0.001$). However, further randomized-controlled trials that had a larger sample size and included all costs such as direct medical costs, direct non-medical costs, and indirect costs would be done to confirm the benefit of SDS.

Herniorrhaphy in same-day surgery was usually done under local anesthesia (LA) because safe, low complication, and cost-effective.[4-14] But many surgeons did not interest in herniorrhaphy under LA and denied operating under GA in same-day surgery due to worried about costs and complications. Even though, several studies have shown the safety and benefit of herniorrhaphy under GA in same-day surgery.[3,15-16]

This study reassured the hospital that no surgeon preferred herniorrhaphy under LA such as Songkhla Hospital to proceed the herniorrhaphy under GA in SDS.

Conclusion

Herniorrhaphy under GA in same-day surgery had lower medical costs, shorter length of stay, and no increased overall complication compared to traditional care.

REFERENCES

1. Baskerville PA, Jarret PEM. Day case inguinal hernia. Ann R Coll Surg Engl. 1983;65:224-5.
2. Division of Medical Technical and Academic Affairs. Recommendations for the development of the service system ODS (One Day Surgery). Nonthaburi: Division of Medical Technical and Academic Affairs; 2017 [cited 2019 September 20]. Available from: http://203.157.39.44/uploads/E000001/b052513ab8ca5ab33f0f425f186f801.pdf.
3. Pere P, Harju J, Kairaluoma P, et al. Randomized comparison of the feasibility of three anesthetic techniques for day-case open inguinal hernia repair. J Clin Anesth. 2016;34:166e175. PubMed PMID:27687366.
4. Hantanyapong, N. Cost effective of Pediatric One Day Surgeryin Indirect Inguinal Hernia and Hydrocele. Reg 4-5 Med J. 2018;30:87-92.
5. Argo M, Favela J, Phung T, et al. Local vs. other forms of anesthesia for open inguinal hernia repair: A meta-analysis of randomized controlled trials. Am J Surg. 2019;218(5):1008-1015. doi:10.1016/j.amjsurg.2019.06.024.
6. Chainapapong K. Groin Hernia Repair under Local Anesthesia in One Day Surgery-8-year Experience. Thai J Surg. 2019;40(2):27-34.
7. Sanjay P, Woodward A. Inguinal hernia repair: local or general anaesthesia? Ann R Coll Surg Engl. 2007;89(5):497-503. doi:10.1308/003588407X202056.
8. Milone F, Salvatore G, Leongito M, et al. Hernia repair and local anesthesia. Results of a controlled randomized clinical trial. Geka Chiryo. 2010;31(11-12):552e555. PubMed PMID:21232203.
9. Huntington CR, Wormer BA, Cox TC, et al. Local anesthesia in open inguinal hernia repair improves postoperative quality of life compared to general anesthesia: a prospective, international study. Am Surg. 2015;81(7):704e709. PubMed PMID: 26140891.
10. Ozgun H, Nil Kurt M, Kurt I, et al. Comparison of local, spinal and general anaesthesia for inguinal herniorrhaphy. Eur J Surg. 2002;168:455-9.
11. Nordin P, Zetterstrom H, Gunnarsson U, et al. Local, regional or general anaesthesia in groin hernia repair: multicentre randomised trial. Lancet. 2003;362:853-7.
12. Zeb MH, Pandian TK, El Khatib MM, et al. Risk factors for postoperative hematoma after inguinal hernia repair: an update. J Surg Res. 2016;205(1):33-37. doi:10.1016/j.jss.2016.06.002.
13. Gonullu NN, Cubukcu A. Comparison of local and general anesthesia in tension-free (Lichtenstein) hernioplasty: a prospective randomised trial. Hernia. 2002;6:29-32.
14. Phanthabordeekorn, W. Comparison of Herniorrhaphy under Local Anesthesia versus General Anesthesia and Spinal Block in Paholpolpayuhasena Hospital. Reg 4-5 Med J. 2018;26;311-5.
15. Nordin P, Zetterström H, Carlsson P, et al. Cost–effectiveness analysis of local, regional and general anaesthesia for inguinal hernia repair using data from a randomized clinical trial. British Journal of Surgery. 2007;94(4):500-505. doi:10.1002/bjs.5543.
16. Aydin M, Fikatas P, Denecke C, et al. Cost analysis of inguinal hernia repair: the influence of clinical and hernia-specific factors. Hernia. 2021;25(5):1129-1135. doi:10.1007/s10029-021-02372-1.

บทคัดย่อ การวิเคราะห์ค่าใช้จ่ายของการผ่าตัดไส้เลื่อนขาหนีบภายใต้การดมยาสลบแบบวันเดียวกลับ

เมธัส อรัญนารถ, พบ.
กลุ่มงานศัลยกรรม โรงพยาบาลสงขลา จังหวัดสงขลา

ความเป็นมา: การผ่าตัดแบบวันเดียวกลับ คือกระบวนการที่ทำการผ่าตัดแล้วให้กลับบ้านในวันเดียวกัน มีประโยชน์ในการลดความแออัด ลดการรอคอย เพิ่มการเข้าถึงบริการ และลดค่าใช้จ่ายทางการแพทย์ มีหลายงานวิจัยแสดงให้เห็นว่าการผ่าตัดไส้เลื่อนภายใต้การดมยาสลบมีความปลอดภัย และสามารถทำการผ่าตัดแบบวันเดียวกลับได้ อย่างไรก็ตามยังไม่มีงานวิจัยที่ศึกษาวิเคราะห์ค่าใช้จ่ายของการผ่าตัดไส้เลื่อนภายใต้การดมยาสลบแบบวันเดียวกลับอย่างเฉพาะเจาะจง

วัตถุประสงค์: เปรียบเทียบค่าใช้จ่ายทางการแพทย์โดยตรงของการผ่าตัดไส้เลื่อนภายใต้การดมยาสลบ ระหว่างการผ่าตัดแบบวันเดียวกลับกับการรักษาแบบดั้งเดิม

วิธีการศึกษา: เป็นการศึกษาแบบเก็บข้อมูลย้อนหลัง โดยทบทวนเวชระเบียนของผู้ป่วยที่ได้รับการผ่าตัดไส้เลื่อนแบบดมยาสลบ ในช่วงเวลา 5 ปี (พ.ศ. 2561-2565) ผู้ป่วยที่มี ASA class ≥ III, ไส้เลื่อนชนิดเป็นซ้ำ, มีไส้เลื่อนขาหนีบสองข้าง, การผ่าตัดไส้เลื่อนที่มีการผ่าตัดอื่นร่วมด้วย, ภาวะไส้เลื่อนติดคาฉับพลัน (Acute incarcerated hernia) และมีไส้เลื่อนร่วมกับลำไส้ขาดเลือด (Strangulated hernia) จะถูกคัดออกจากการศึกษานี้ แล้วทำการเปรียบเทียบข้อมูลพื้นฐาน และค่าใช้จ่ายทางการแพทย์โดยตรง ระหว่างกลุ่มผ่าตัดแบบวันเดียวกลับกับกลุ่มรักษาแบบดั้งเดิม

ผลการศึกษา: ผู้ป่วย 49 ราย แบ่งเป็น กลุ่มรักษาแบบดั้งเดิม 25 ราย และกลุ่มผ่าตัดแบบวันเดียวกลับ 24 ราย ค่าใช้จ่ายทางการแพทย์โดยรวมของกลุ่มผ่าตัดแบบวันเดียวกลับ มีค่าต่ำกว่าอย่างมีนัยสำคัญ (6,081 ± 712 บาท เทียบกับ 9,445 ± 3,499 บาท, ความแตกต่างเฉลี่ย 3,246 บาท, $p > 0.001$) ระยะเวลานอนโรงพยาบาลของกลุ่มผ่าตัดแบบวันเดียวกลับ มีค่าต่ำกว่าอย่างมีนัยสำคัญ (0.31 ± 0.19 วัน เทียบกับ 3.33 ± 2.13 วัน, ความแตกต่างเฉลี่ย 3.11 วัน, $p > 0.001$) โดยที่ภาวะแทรกซ้อนโดยรวมหลังผ่าตัดของทั้งสองกลุ่ม ไม่แตกต่างกันอย่างมีนัยสำคัญ

สรุปผลการศึกษา: การผ่าตัดไส้เลื่อนแบบดมยาสลบแบบวันเดียวกลับ มีค่าใช้จ่ายทางการแพทย์ต่ำกว่า ระยะเวลานอนโรงพยาบาลสั้นกว่า และไม่มีความแตกต่างของภาวะแทรกซ้อนโดยรวม เมื่อเปรียบเทียบกับการรักษาแบบดั้งเดิม

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Original Article

Outcomes of Sentinel Lymph Node Biopsy by Using Isosulfan Blue Dye Alone Technique in Early Breast Cancer Patients

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Abstract

Background: Sentinel lymph node biopsy (SLNB) in patients with early-stage breast cancer with undetected axillary lymph node abnormalities is the current standard surgery. It is generally recommended that isosulfan blue and radiocolloid be injected together for a higher identification rate of the sentinel lymph nodes. But radiocolloids are expensive, specialized detection equipment and specialized staff are required. Therefore, it is the origin of this study to determine whether the injection of isosulfan blue injection alone, because it is cheap, safe and easy to access, will be able to provide standard sentinel lymph node identification result.

Methods: This is a retrospective study of breast cancer patients underwent SLNB by using isosulfan blue dye injection alone technique of Maharat Nakhon Ratchasima Hospital by Dr. Noppadol Trikunagonvong. From August 1st, 2016 to May 31st, 2022, there are 81 people.

Results: The mean age of the patients was 52.4 years (range, 31 to 71 years). Fifty-nine patients (72.84%) underwent mastectomy and 22 patients (27.16%) underwent breast conserving surgery. Mean (standard deviation) number of SLN were 3.73 (1.6) nodes. The identification rate of sentinel lymph nodes was 95.06%. The accuracy of frozen section report of our hospital was 97.4%. Fifty-one patients (66.23%) had negative SLNB and 26 patients (33.77%) had positive SLNB. ALND was reduced by 66.23%. There were 35 of 51 patients whose SLNB were negative and were followed for more than 2 years, 1 recurrence (2.85%) was found.

Conclusion: SLNB, using isosulfan blue dye alone technique, is a reliable, inexpensive, safe and simple surgery alternative.

Keywords: Sentinel lymph node biopsy, Isosulfan blue dye, Identification rate

Introduction

There are an estimated 19.3 million new cancer cases worldwide in 2020. Female breast cancer was the most commonly diagnosed cancer, with an estimated 2.3 million new cases (11.7%).[1] Surgical procedure is the one of main treatment in breast cancer that can divide in breast and axillary surgery. Breast surgery can be performed wide excision or mastectomy with or without reconstruction. Axillary surgery, in the past we performed radical axillary lymph node dissection (ALND) in all patients as standard treatment[2] and it caused many serious complications such as arm lymphedema and paresthesia.[3] Majority cases of early breast cancer did not have axillary lymph node metastasis so there were many patients underwent the unnecessary radical axillary lymph node dissection and had many complications. Sentinel lymph node biopsy (SLNB) was developed for solving this problem.

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Sentinel lymph nodes are defined as the first lymph node group which cancer cells are most likely to spread from a primary tumor. In 1994, Guiliano AE and his colleagues reported the feasibility and accuracy of intraoperative lymphatic mapping via Isosulfan blue dye with sentinel lymphadenectomy in patients with breast cancer. Sentinel lymph nodes were identified in 114 of 174 (65.5%) procedures and accurately predicted axillary nodal status in 109 of 114 (95.6%) cases.[4] From this research, SLNB was interested by many surgeons. There were many researches reported about lymphatic mapping via radioisotope agent, blue dye agent, indocyanine green alone and combine with two agents. Identification rates were more than 85% in all agents alone but more accurate in combine agents and false negative rate was less than 5%.[5–11]

ALND had more paresthesia (risk ratio [RR] 0.26, 95% confidence interval [CI] 0.20-0.33; $p < 0.01$) and lymphedema (RR 0.28, 95% CI 0.20-0.41; $p < 0.01$) than those had SLNB alone. There were no significant differences in overall survival (hazard ratio [HR] 0.95, 95% CI 0.85-1.06; $p = 0.35$), disease-free survival (HR 1.00, 95% CI 0.98-1.02, $p = 0.96$), and locoregional recurrence (RR 0.92, 95% CI 0.59-1.44; $p = 0.73$).[3] In 2010 and 2013, Krag and his colleague reported at 10 years no significant differences were observed in overall survival (OS), Disease free survival (DFS), or regional control between the SLNB and ALND in clinically node-negative breast cancer patients groups (At 10 years, no significant difference in OS between the two groups (HR: 1.11, $p = 0.27$). 10 yr Kaplan-Meier (K-M) estimates for OS are 87.8% and 88.9%. No significant difference in DFS between the two groups (HR: 1.01, $p = 0.92$). 10-yr K-M estimates for DFS were 76.9% for both groups).[12–14] Accordingly SLNB became the standard procedure of axillary treatment in early-stage breast cancer with negative lymph node patients

In 1999, Ratanawichitrasin A. and his colleagues had the first reported in Thailand about outcomes of sentinel lymph node mapping with Isosulfan blue dye in breast cancer patients. Their research was able to identify sentinel lymph node 87% and can accurately diagnose axillary metastasis when compared to the axillary dissection 92% of all patients.[10]

Patients and Methods

All breast cancer patients who underwent surgical treatments by Dr.Noppadol Trikunagonvong at Maharat Nakhon Ratchasima Hospital from August 1st, 2016 to May 31st, 2022 were included. All patients underwent standard preoperative evaluations, including clinical examination, digital mammography, and breast and axillary ultrasonography. Magnetic resonance imaging is not routinely performed.

Inclusion criteria

1. Invasive breast cancer patients who underwent breast surgery and SLNB
2. Tumor size less than or equal 5 cm.
3. Clinically node-negative (both of clinical examination and imaging)

Exclusion Criteria

1. Patient who already had distant metastasis.
2. Clinically node-positive and FNA demonstrated cancer metastasis
3. Pregnancy
4. Patient who was received neo-adjuvant chemotherapy
5. Recurrent breast cancer
6. DCIS

The study was approved by the Research Ethics Committee of our institute.

SLNB technique: After induction of general anesthesia and sterile fashion, we used isosulfan blue dye 3-4 cc. injected into subdermal layer of periareolar area and peritumoral area then massage around injection site for 5 minutes. In patient who planned to underwent breast conservative surgery, skin incision was made at 1 cm. below the lowest hair line of axilla perpendicular with Pectolaris major muscle edge but in patient who planned to mastectomy, we used the same incision with mastectomy. Axilla was explored under direct vision. Sentinel lymph nodes identified as blue staining nodes, we dissected and removed all blue nodes and its nearby lymph nodes. We usually removed at least 3-4 nodes and sent for frozen section (FS). If FS positive, we performed an immediate ALND and if FS negative, we did not perform further axillary surgery. To verify frozen section report, the pathologist will report the result again as permanent pathological result in 2 weeks.

All demographic data, tumor characteristics and oncological outcomes were presented using descriptive statistics. Means, standard deviations (SD), medians,

and ranges were used for continuous variables, while frequencies and percentages were used for the categorical variables. The primary outcome was the identification rate of sentinel lymph node biopsy in clinically negative axillary lymph node breast cancer. All statistical analyses were performed using STATA version 11.1.

Results

Eighty-one early breast cancer patients underwent SLNB by using blue dye alone technique between August 1st, 2016 to May 31st, 2022. The mean age of the patients was 52.4 years (range, 31 to 71 years). Thirty-seven patients (45.68%) had mass in upper outer quadrant, 17 patients (20.99%) in upper inner quadrant and central quadrant, 6 patients (7.41%) in lower inner quadrant and 4 patients (4.94%) in lower outer quadrant. Seventy-nine patients (97.53%) presented with clinically negative axillary lymph node status and 2 patients (2.47%) presented with enlarged axillary lymph node but FNA reported negative for malignancy cells. Fifty-nine patients (72.84%) underwent mastectomy and 22 patients (27.16%) underwent breast conserving surgery. Patient characteristics are shown in Table 1.

Table 1 Baseline characteristics of 81 SLNB patients

Characteristics	Summary
Sex: n (%)	
Female	81 (100)
Male	0 (0)
Age (years): median (range)	52.44 (31 - 71)
Tumor location: n (%)	
Upper outer quadrant	37 (45.68)
Upper inner quadrant	17 (20.98)
Lower outer quadrant	4 (4.94)
Lower inner quadrant	6 (7.41)
Central quadrant	17 (20.99)
Clinical lymph node status: n (%)	
Negative	79 (97.53)
Positive but FNA demonstrated negative for cancer	2 (2.47)
Breast operation: n (%)	
Breast conservative surgery	22 (27.16)
Mastectomy	59 (72.84)

In all patients, grade 2 was the most pathologic tumor grading had 47 patients (58.03%), grade 3 had 28 patients (34.57%) and grade 1 had 6 patients (7.40%). Thirty-seven patients (45.68%) had tumor size not more than 2 cm. Twenty-three patients (28.40%) had 2.1 to 3 cm. Twenty-one patients (25.92%) had 3.1 to 5 cm. The most breast cancer subtype were Luminal A and Triple negative breast cancer, each having the same number of 23 patients (28.4%), Luminal B HER-2 negative had 19 patients (23.46%), Luminal B HER-2 positive had 10 patients (12.34%), and Non-luminal HER-2 positive had 6 patients (7.40%). The number of patients with LN staging in N0, N1, N2, N3 were 53 patients (65.43%), 23 patients (28.40%), 4 patients (4.94%) and 1 patient (1.23%) respectively. Tumor characteristics are shown in Table 2.

Table 2 Tumor's characters

Characteristics	Summary
Pathologic tumor grading: n (%)	
Grade 1	6 (7.40)
Grade 2	47 (58.03)
Grade 3	28 (34.57)
Pathologic tumor size: n (%)	
Tumor ≤ 2 cm.	37 (45.68)
Tumor > 2-3 cm.	23 (28.40)
Tumor > 3-5 cm.	21 (25.92)
St Gallen breast cancer subtype: n (%)	
Luminal A	23 (28.40)
Luminal B, HER-2 negative	19 (23.46)
Luminal B, HER-2 positive	10 (12.34)
Non-luminal HER-2 positve	6 (7.40)
Triple negative	23 (28.40)
Pathologic LN staging: n (%)	
N0	53 (65.43)
N1 (1-3)	23 (28.40)
N2 (4-9)	4 (4.94)
N3 (> 9)	1 (1.23)

The sentinel lymph nodes can identify in 77 of 81 patients (95.06%). Mean (standard deviation) number of SLN were 3.73 (1.6) nodes. Fifty-one patients (66.23%) had negative SLNB and 26 patients (33.77%) had positive SLNB which had macrometastasis 23 patients (88.46%) and micrometastasis 3 patients (11.54%).

In positive SLNB group, we underwent immediately axillary lymph node dissection (ALND) and found only 9 patients (42.31%) had non-sentinel LN metastasis and 15 patients (57.69%) had no further LN metastasis. When compared frozen section and permanent reports, there were only 2 of 77 results (2.6%) out of SLNB reports were reported mismatch. And all of 2 mismatch reports were negative SLNB results. Thus, accuracy of frozen section report of our hospital was 97.4%. And no patient who underwent SLNB, had allergic reaction. Four patients who failed for SLNB we underwent ALND instead. Two patients (50%) had LN metastasis but others had not. There were 35 of 51 patients whose SLNB were negative and were followed for more than 2 years, 1 recurrence (2.85%) was found. Data are shown in Table 3.

Table 3 Result of sentinel lymph nodes biopsy

Characteristics	n (%)
Number of sentinel node (mean ± SD)	3.73 ± 1.60
Sentinel identified	77 (95.06)
SLN not identified and underwent ALND (n = 4)	
Negative metastatic LN	2 (50.00)
Positive metastatic LN	2 (50.00)
SLNBx negative	51/77 (66.23)
SLNBx positive (n = 26)	26/77 (33.77)
Micrometastasis	3 (11.54)
Macrometastasis	23 (88.46)
SLNBx positive and underwent ALND (n = 26)	
Negative non-sentinel metastatic LN	15 (57.69)
Positive non-sentinel metastatic LN	9 (42.31)
Accuracy of frozen section report (compared to permanent report) (n = 77)	75 (97.40)
Allergic reaction	0 (0)

Discussion

Lymph node (LN) metastasis is the one of most predictive factors that affect to prognosis, and recurrence. Identification of LN status is therefore very important. In the past, ALND was the mainstay surgical treatment of axilla and caused many serious complications such as lymph edema and paresthesia[3] until SLNB was introduced. From several studies that examined the comparisons between SLNB and ALND in early breast cancer patients with negative axillary LN metastasis reported that no significant difference in the survival and axillary LN recurrence but SLNB causes significantly less complications than ALND.[3,11–16] However, identification rate of SLN is very important. Guidelines from the American society of clinical oncology (ASCO) recommended a rate of SLN identification should more than 85% and false negative rate should less than 5%. Surgeons should maintains that performance of a minimum of 20 SLNB procedures in combination with axillary dissection or with mentoring is necessary to minimize the risk of false-negative results.[11] Data from several trials recommended addition of radiocolloid agents with blue dye can increase identification rate up to 97%.[6,17–19] Indocyanine green was also used as an injection which can identified SLN 97 to 100%.[20,21] But radiocolloid agents and indocyanine green are expensive and require specialized equipment to detect them. Therefore, we used only isosulfan blue dye alone in SLNB due to low cost, safe and can underwent by direct vision.

In Thailand, there are several researches which study about identification rate of SLNB in early breast cancer patients by using blue dye alone technique. Identification rate ranges from 87 to 98%.[10,22–25] In this study, the identification rate of SLNB by using isosulfan blue dye alone technique was 95.06% which was better than the ASCO instructions given and the accuracy of frozen section report of our hospital was 97.4%. Fifty-one patients (66.23%) had negative SLNB status, therefore we can reduce unnecessary ALND by 66.23%. Data from the ACOSOG Z0011 (Alliance) trial which Eligible patients were women who underwent breast conserving surgery with clinical T1 or T2 invasive breast cancer, non-palpable axillary adenopathy, and 1 or 2 sentinel lymph nodes containing metastases and planned further systemic treatment and radiation can omit ALND without affecting recurrence and survival rates.[26,27] Currently, ASCO and NCCN guidelines recommended that patients with indications meet ACOSOG Z0011 trial can safely omit ALND.[11,16] If we follow these guidelines, we can reduce unnecessary ALND by 70.37%. However, most of the patients in this study chose Mastectomy because they did not want to receive radiation because they wanted to return to work as soon as possible. Therefore, if most of patients choose breast conservative surgery, not only will we able to greatly reduce unnecessary ALND but we will also be able to reduce unwanted complications.

Conclusion

SLNB in patients with early-stage breast cancer with clinically negative axillary LN can reduce unnecessary ALND and unwanted complications. SLNB, using the injection technique isosulfan blue dye alone, is a reliable, inexpensive, safe and simple surgery alternative.

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Conflict of Interest

No authors have any potential conflict of interest to disclose.

REFERENCES

1. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin. 2021;71(3):209-49.
2. Halsted WS. I. The Results of Operations for the Cure of Cancer of the Breast Performed at the Johns Hopkins Hospital from June, 1889, to January, 1894. Ann Surg. 1894;20(5):497-555.
3. Li CZ, Zhang P, Li RW, et al. Axillary lymph node dissection versus sentinel lymph node biopsy alone for early breast cancer with sentinel node metastasis: A meta-analysis. Eur J Surg Oncol. 2015;41(8):958-66.
4. Giuliano AE, Kirgan DM, Guenther JM, et al. Lymphatic mapping and sentinel lymphadenectomy for breast cancer. Ann Surg. 1994;220(3):391-401.
5. Giuliano AE, Jones RC, Brennan M, et al. Sentinel lymphadenectomy in breast cancer. J Clin Oncol. 1997;15(6):2345–50.
6. Veronesi U, Paganelli G, Galimberti V, et al. Sentinel-node biopsy to avoid axillary dissection in breast cancer with clinically negative lymph-nodes. Lancet. 1997;349(9069):1864-7.
7. Cody HS. Clinical aspects of sentinel node biopsy. Breast Cancer Res. 2001;3(2):104-8.
8. Tuttle TM, Colbert M, Christensen R, et al. Subareolar injection of 99mTc facilitates sentinel lymph node identification. Ann Surg Oncol. 2002;9(1):77-81.
9. Mathelin C, Croce S, Brasse D, et al. Methylene Blue Dye, an Accurate Dye for Sentinel Lymph Node Identification in Early Breast Cancer. Anticancer Res. 2009;29(10):4119-25.
10. Ratanawichitrasin A, Rojananin S, Bhothisuwan K, et al. Lymphatic Mapping with Isosulfan Blue and Sentinel Lymph Node Biopsy for Breast Cancer Patients. Thai J Surg. 1999;20(3):93-6.
11. Lyman GH, Giuliano AE, Somerfield MR, et al. American Society of Clinical Oncology guideline recommendations for sentinel lymph node biopsy in early-stage breast cancer. J Clin Oncol. 2005;23(30):7703–20.
12. Krag DN, Anderson SJ, Julian TB, et al. Primary outcome results of NSABP B-32, a randomized phase III clinical trial to compare sentinel node resection (SNR) to conventional axillary dissection (AD) in clinically node-negative breast cancer patients. JCO. 2010;28(18_suppl):LBA505-LBA505.
13. Krag DN, Anderson SJ, Julian TB, et al. Sentinel-lymph-node resection compared with conventional axillary-lymph-node dissection in clinically node-negative patients with breast cancer: overall survival findings from the NSABP B-32 randomised phase 3 trial. Lancet Oncol. 2010;11(10):927-33.
14. Julian TB, Anderson SJ, Krag DN, et al. 10-yr follow-up results of NSABP B-32, a randomized phase III clinical trial to compare sentinel node resection (SNR) to conventional axillary dissection (AD) in clinically node-negative breast cancer patients. JCO. 2013;31(15_suppl):1000.
15. Xiang J, Huang S, Tuo Y, et al. Effect of breast-conserving surgery combined with sentinel lymph node biopsy and axillary preservation on the recurrence, metastasis, complications and cosmetic results of early breast cancer patients. Gland Surg. 2020;9(4):1019-25.
16. Lyman GH, Somerfield MR, Bosserman LD, et al. Sentinel Lymph Node Biopsy for Patients With Early-Stage Breast Cancer: American Society of Clinical Oncology Clinical Practice Guideline Update. J Clin Oncol. 2017;35(5):561-4.
17. Krag DN, Weaver DL, Alex JC, et al. Surgical resection and radiolocalization of the sentinel lymph node in breast cancer using a gamma probe. Surgical Oncology. 1993;2(6):335-40.
18. Layeeque R, Kepple J, Henry-Tillman RS, et al. Intraoperative Subareolar Radioisotope Injection for Immediate Sentinel Lymph Node Biopsy. Annals of Surgery. 2004;239(6):841.
19. Fleming FJ, Hill AD, Kavanagh D, et al. Intradermal radioisotope injection optimises sentinel lymph node identification in breast cancer. Eur J Surg Oncol. 2003;29(10):835-8. doi:10.1016/j.ejso.2003.08.027.
20. Liu J, Huang L, Wang N, et al. Indocyanine green detects sentinel lymph nodes in early breast cancer. J Int Med Res. 2017;45(2):514-524. doi:10.1177/0300060516687149.
21. Lin J, Lin LS, Chen DR, et al. Indocyanine green fluorescence method for sentinel lymph node biopsy in breast cancer. Asian J Surg. 2020;43(12):1149-1153. doi:10.1016/j.asjsur.2020.02.003.
22. Areerattanavet K. Identification Rate of Sentinel Lymph Node Biopsy using Single Technique (Isosulfan Blue Dye) in Early Breast Cancer in Lopburi Cancer Hospital. J Dept Med Ser. 2021;46(3):73-80.
23. Ratchaworapong K, Thanawut S, Yodavudh S, et al. Rate of sentinel lymph node identification using isosulfan blue dye in breast cancer patients at Charoenkrung Pracharak Hospital, Thailand. Asian Biomedicine. 2014;8(4):517-24.

24. Kongdan Y, Chirappapha P, Lertsithichai P. Effectiveness and reliability of sentinel lymph node biopsy under local anesthesia for breast cancer. The Breast. 2008;17(5):528-31.
25. Kantaraksa N, Kongdan Y, Suvikapakornkul R, et al. The relative false negative rate of isosulfan blue in detecting sentinel lymph nodes in early breast cancer. J Med Assoc Thai. 2012;95(2): 181-5.
26. Giuliano AE, McCall LM, Beitsch PD, et al. ACOSOG Z0011: A randomized trial of axillary node dissection in women with clinical T1-2 N0 M0 breast cancer who have a positive sentinel node. JCO. 2010;28(18_suppl):CRA506-CRA506.
27. Giuliano AE, Ballman KV, McCall L, et al. Effect of Axillary Dissection vs No Axillary Dissection on 10-Year Overall Survival Among Women With Invasive Breast Cancer and Sentinel Node Metastasis: The ACOSOG Z0011 (Alliance) Randomized Clinical Trial. JAMA. 2017;318(10):918-26.

บทคัดย่อ **รายงานผลการผ่าตัดตรวจต่อมน้ำเหลืองเซนทิเนลโดยใช้การฉีดสาร Isosulfan blue ในผู้ป่วยมะเร็งเต้านมระยะเริ่มต้น**

นพดล ไตรคุณากรวงศ์, พบ.

กลุ่มงานศัลยกรรม โรงพยาบาลมหาราชนครราชสีมา

ความเป็นมา: การผ่าตัดตรวจต่อมน้ำเหลืองเซนทิเนลในผู้ป่วยมะเร็งเต้านมระยะเริ่มต้นที่ตรวจไม่พบความผิดปกติของต่อมน้ำเหลืองที่รักแร้ เป็นการผ่าตัดที่เป็นมาตรฐานในปัจจุบัน โดยมีคำแนะนำให้ฉีดสาร Isosulfan blue และสาร Radiocolloid ร่วมกันเพื่อให้อัตราการตรวจพบต่อมน้ำเหลืองเซนทิเนลสูงขึ้น แต่สาร Radiocolloid มีราคาแพง ต้องมีเครื่องมือตรวจจับเฉพาะ มีแพทย์และเจ้าหน้าที่เฉพาะทาง จึงเป็นที่มาของงานวิจัยนี้ว่าการฉีดสาร Isosulfan blue เพียงแค่ตัวเดียวเนื่องจากราคาไม่แพง ปลอดภัย และสามารถเข้าถึงได้ง่าย จะสามารถให้ผลลัพธ์ที่ผ่านเกณฑ์มาตรฐานได้หรือไม่

วิธีการศึกษา: เป็นการศึกษาข้อมูลย้อนหลังของผู้ป่วยมะเร็งเต้านมที่ได้รับการผ่าตัดต่อมน้ำเหลืองเซนทิเนล โดยใช้เทคนิคการฉีดสาร Isosulfan blue dye ของโรงพยาบาลมหาราชนครราชสีมา โดย นพ.นพดล ไตรคุณากรวงศ์ ตั้งแต่วันที่ 1 สิงหาคม พ.ศ. 2559 - 31 พฤษภาคม พ.ศ. 2565 มีจำนวน 81 ราย

ผลการศึกษา: อายุเฉลี่ยของผู้ป่วยคือ 52.4 ปี (น้อยสุด 31 ปี มากสุด 71 ปี) มีผู้ป่วยที่ได้รับการผ่าตัดเต้านมออกทั้งหมด 59 ราย (72.84%) อีก 22 ราย (27.16%) ผ่าตัดแบบสงวนเต้านม มีจำนวนต่อมน้ำเหลืองเซนทิเนลที่นำไปตรวจเฉลี่ย 3.73 ต่อม อัตราการตรวจพบต่อมน้ำเหลืองเซนทิเนลเท่ากับ 95.06% ความถูกต้องของการรายงานผล Frozen section เมื่อเทียบกับการรายงานผลชิ้นเนื้อแบบถาวรคือ 97.4% มีผู้ป่วยที่มีผลการตรวจต่อมน้ำเหลืองเซนทิเนลเป็นลบ 51 ราย (66.23%) อีก 26 ราย (33.77%) มีผลการตรวจเป็นบวก การผ่าตัดตรวจต่อมน้ำเหลืองเซนทิเนลสามารถลดการผ่าตัดเลาะต่อมน้ำเหลืองที่รักแร้ออกทั้งหมดได้ 66.23% มีผู้ป่วย 35 ราย จาก 51 รายในกลุ่มที่ผลการตรวจต่อมน้ำเหลืองเซนทิเนลเป็นลบ มีระยะเวลาในการตรวจติดตามเกิน 2 ปี ในจำนวนนี้พบผู้ป่วยมีการกลับเป็นซ้ำ 1 ราย และไม่มีผู้ป่วยมีอาการแพ้เลย

สรุปผลการศึกษา: การผ่าตัดต่อมน้ำเหลืองเซนทิเนลด้วยวิธีการฉีดสาร Isosulfan blue เพียงตัวเดียว ให้ผลการผ่าตัดที่น่าเชื่อถือ ราคาถูก เข้าถึงได้ง่าย ไม่ซับซ้อน ปลอดภัย สามารถใช้เป็นอีกทางเลือกหนึ่งในการผ่าตัดได้

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Original Article

Survival Rate in Curative Resection of Gastric Cancer Patients at Maharat Nakhon Ratchasima Hospital

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Abstract

Background: Gastric cancer still remains an important cancer because of the mortality rate of this lethal disease is high, this cancer has rapid progression and it is difficult to detect early stage. Survival rate is variety between geographically and accurate prognostic factors for gastric cancer are still limited.

Objective: The aim of this study was to evaluate survival rate and the clinicopathological factors associated with survival of gastric cancer patients.

Methods: Data of gastric cancer patients who underwent resection were collected from medical records between January 1, 2012 to December 31, 2016 (5 years). The primary outcome was overall survival by Kaplan-Meier method. Univariable and multivariable Cox proportional hazard regression analysis were performed to determine independent prognostic factors.

Results: Of 96 patients, mean age was 62.4 years, lower third was the most common tumor location, total gastrectomy was the most common procedure. The study demonstrated median survival time was 12.4 months and 1-year, 3-year, 5-year survival rates were 53%, 18%, and 12% respectively. Univariable Cox regression found that lymph node ratio (LNR) > 0.4 (HR 3.96, 95% CI 1.81-8.67, $p = 0.001$) and stage IV (HR 8.41, 95% CI 1.88-37.57, $p = 0.005$) were associated with poor survival. Multivariable Cox regression analyses showed that only staging IV (HR 9.02, 95% CI 1.35-60.20, $p = 0.024$) was significantly associated with survival.

Conclusion: Our study demonstrates that clinical stage IV is the independent prognostic factor associated with poor survival outcome.

Keywords: Gastric cancer, Survival rate, Prognostic factors

Introduction

Gastric cancer remains an important cancer worldwide because of the mortality rate of this lethal disease is high, this cancer has rapid progression and it is difficult to detect early stage. Despite the steady decline in its incidence rate and mortality in recent years, survival rate of gastric cancer still is dismal. In 2020, estimated 1,089,103 new cases and 768,793 deaths, ranking fifth for incidence and fourth for mortality globally.[1] National Cancer Institute of Thailand reported the age-standardized incidence rate of gastric cancer was 4.1 per 100,000 per year in Thai males and 2.6 per 100,000 per year in Thai females and it is the eighth leading cancer in males and the ninth in females.[2] 5-year survival rate is variety

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in range which high in Japan (60-70.5%) compare to western (10-25%).[3-6] Report from Thailand showed 5-year survival rate was high (59%).[7] Many clinicopathologic factors associated with gastric cancer survival including tumor size, surgical margin, depth invasion, lymph node metastasis, lymph node ratio (LNR), blood loss, and body mass index (BMI).[8-12] This study aims to evaluate survival rate and the clinicopathological factors associated with survival of gastric cancer patients.

Materials and Methods

Study population

Data were collected retrospectively from medical records at Maharat Nakhon Ratchasima Hospital between January 1, 2012 to December 31, 2016 (5 years) of patients with gastric cancer codes ICD10 (C161, C162, C163, C164, C165, C166, C167, C168, C169). All elective patients underwent gastric resection and had pathological report confirmed gastric adenocarcinoma. We excluded patients with adenocarcinoma of cardia, metastatic other cancers to stomach and recurrent gastric cancer. After that, patients were followed until December 31, 2021. Clinicopathological factors were collected including gender, age, tumor size (< 5 cm, > 5 cm),[8] body mass index (BMI) (< 18.5 kg/m^2, 18.5 - < 23 kg/m^2, > 23 kg/m^2),[9] surgical margin (negative, positive), lymphovascular invasion (LVI) (negative, positive), intraoperative blood loss (IBL) (< 400 ml, > 400 ml),[10] lymph node ratio (LNR) (0, < 0.13, > 0.13 - < 0.4, > 0.4),[12] and staging base on American Joint Committee on Cancer 7th edition (AJCC7th) (4 major subgroups).[13]

Statistical analysis

Histograms, boxplots, and descriptive methods were used to examine data for errors, outliers, and missing values. All statistical analyses were performed with STATA, version 11.0, software (StataCorp LP, College Station, Texas). The survival analysis was calculated using the Kaplan–Meier method. The independent prognostic factors including gender, age, BMI, tumor size, LVI, LNR, surgical margin, IBL, and staging AJCC7th (4 major subgroups) were examined by Univariable Cox proportional hazard regression analysis. All interested variables included, age, BMI, tumor size, LNR, surgical margin, and staging AJCC7th (4 major subgroups) were forced in final model. The results were expressed as hazard ratios with p-values and 95% confidence intervals. A *p*-value of < 0.05 was considered statistically significant. The local Ethical Committee of our hospital approved the study as Declaration of Helsinki (Document No 054/2022).

Results

Demographic data

Of 96 patients, demographic data are presented in Table 1. Mean age was 62.4 years (ranged 39 to 86). There were more males (68.7%) than females (31.3%). The most common tumor location was lower third (68.7%) and middle third (21.9) was the second most common. Total gastrectomy (40.3%) was the most common operation, and subtotal gastrectomy (33.3%) was the second most common. Only 12 patients (12.5%) were performed D_2 lymphadenectomy. The average number of lymph nodes yield was 16.5 (ranged 0-45). According to the 7th edition American Joint Committee on Cancer (AJCC) staging system for gastric cancer, most patients in this study were in stage III (60.4%) which in IIIC, IIIB, IIIA were 28.1%, 18.8%, and 13.5% respectively and stage IV was 17.8%. Of all patients, only 40.6% were received adjuvant chemotherapy. The mean tumor size was 6.0 cm (ranged 1.5- 15). The average BMI was 19.2 kg/m^2 (ranged 11.4-33.8). Median intraoperative blood loss (OBL) was 225 ml (IQR 137-500). Approximately 31.30% of patients had comorbidities, the most common was hypertension (19.8%) and the second common was diabetes mellitus (7.3%). In Table 2 demonstrated that the most common metastatic site was peritoneal metastasis (9.4%) and the second most common was liver metastasis (5.2%). In present study, we performed peritoneal washing for cytology only 7.2% and 2.1% had positive result. Postoperative morbidities and postoperative mortality are demonstrated in Table 3. Postoperative complication was 22.9% and there were esophagojejunal anastomosis leakage (2.1%), gastrojejunal anastomosis leakage (1%), and pancreatic leakage (1%). There were 2 subdiaphragmatic collection patients which need percutaneous drainage. Reoperation was performed in a patient with gastrojejunal anastomosis leakage. The rest of other anastomosis leakage patients were successfully managed with non-operative treatment. There were 4 postoperative deaths (4.2%) The cause of death were postoperative myocardial infarction and hospital acquire pneumonia with sepsis.

Table 1 Demographic data (N = 96)

Character	n (%)
Age year mean (SD, range)	64.4 (12.5, 31 - 86)
< 60	37 (38.5)
≥ 60	59 (61.5)
Gender	
Male	66 (68.7)
Female	30 (31.3)
Location	
Upper third	6 (6.3)
Middle third	21 (21.9)
Lower third	66 (68.7)
Entire	3 (3.1)
Operation	
Total gastrectomy	39 (40.3)
Subtotal gastrectomy	32 (33.3)
Hemigastrectomy	19 (19.8)
Distal gastrectomy	6 (6.3)
Lymph dissection	
< D_2	84 (87.5)
≥ D_2	12 (12.5)
Lymph nodes yield mean (SD, range)	16.5 (11.5, 0 - 45)
Lymph node ratio (LNR)	
0	12 (13.2)
< 0.13	14 (15.4)
≥ 0.13 - < 0.4	18 (19.8)
≥ 0.4	47 (51.7)
Lymphovascular invasion, n = 70	60 (85.7)
American Joint Committee on Cancer 7th stage	
IA	1 (1.0)
IB	3 (3.1)
IIA	8 (8.3)
IIB	9 (9.4)
IIIA	13 (13.5)
IIIB	18 (18.8)
IIIC	27 (28.1)
IV	17 (17.8)
BMI (kg/m^2) mean (SD, range)	19.2 (4.0, 11.4 - 33.8)
< 18.5	39 (50.0)
18.5 - < 23	26 (33.3)
≥ 23	13 (16.7)
Adjuvant chemotherapy	
Yes	39 (40.6)
No	57 (59.4)
Comorbidity	30 (31.3)
Tumor size (cm) mean (SD, range)	6.0 (2.5, 1.5 - 15)
≤ 5 cm	41 (42.7)
> 5 cm	55 (57.3)
Blood loss (ml) median (IQR Q1-Q3)	225 (137 - 500)

Table 2 Organs metastasis in stage IV (N = 96)

Organ	n (%)
Gross peritoneal metastasis	9 (9.4)
Liver metastasis	5 (5.2)
Ovary	1 (1)
Peritoneal washing cytology	7 (7.3)
Positive	2 (2.1)
Negative	5 (5.2)

Table 3 Postoperative complication and postoperative death (N = 96)

Postoperative complication	n (%)
Postoperative myocardial infarction	2 (2.1)
Hospital acquire pneumonia	3 (3.1)
Wound infection	3 (3.1)
Pancreatic leakage	1 (1)
Esophagojejunal anastomosis leakage	2 (2.1)
Gastrojejunal anastomosis leakage	1 (1)
Subdiaphragmatic collection	2 (2.1)
Prolonged drainage	8 (8.3)
Postoperative deaths	4 (4.2)
Postoperative myocardial infarction	2 (2.1)
Hospital acquire pneumonia with sepsis	2 (2.1)

Survival analysis

Overall survival is demonstrated in Figure 1. Median survival time was 12.4 months (95% CI 9.4-15.4) and 1-year, 3-year, 5-year survival rates were 53% (95% CI 42%-62%), 18% (95% CI 11%-27%), 12% (95% CI 6%-19%) respectively. Figure 2 staging describe AJCC7th showed that 5-year survival rate was 100% in patients with stage IA, 33% for IB, 37% for IIA, 11% for IIB, 19% for IIIA, 11% for IIIB, 11% for IIIC, and 0% for IV.

Clinicopathologic factors analysis

In Table 4 demonstrate that the longest median survival was 33 months for patients with lymph node ratio < 0.13. The mortality rate was highest in stage (subgroups AJCC7th) IV (12 per 100 person-months). The person-months at risk more than 1,500 person-months in patients with negative surgical margin, male gender, and patients with blood loss < 400 ml.

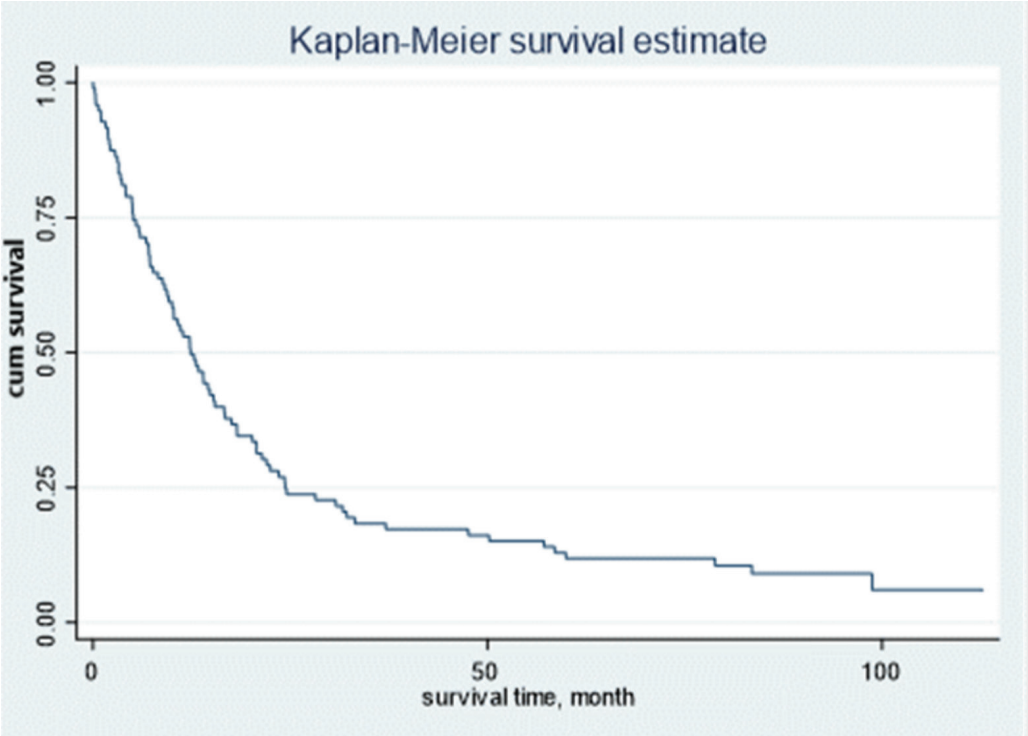

Figure 1 Overall survival gastric cancer patients
Y-axis name: cum survival and X-axis name: time (months)

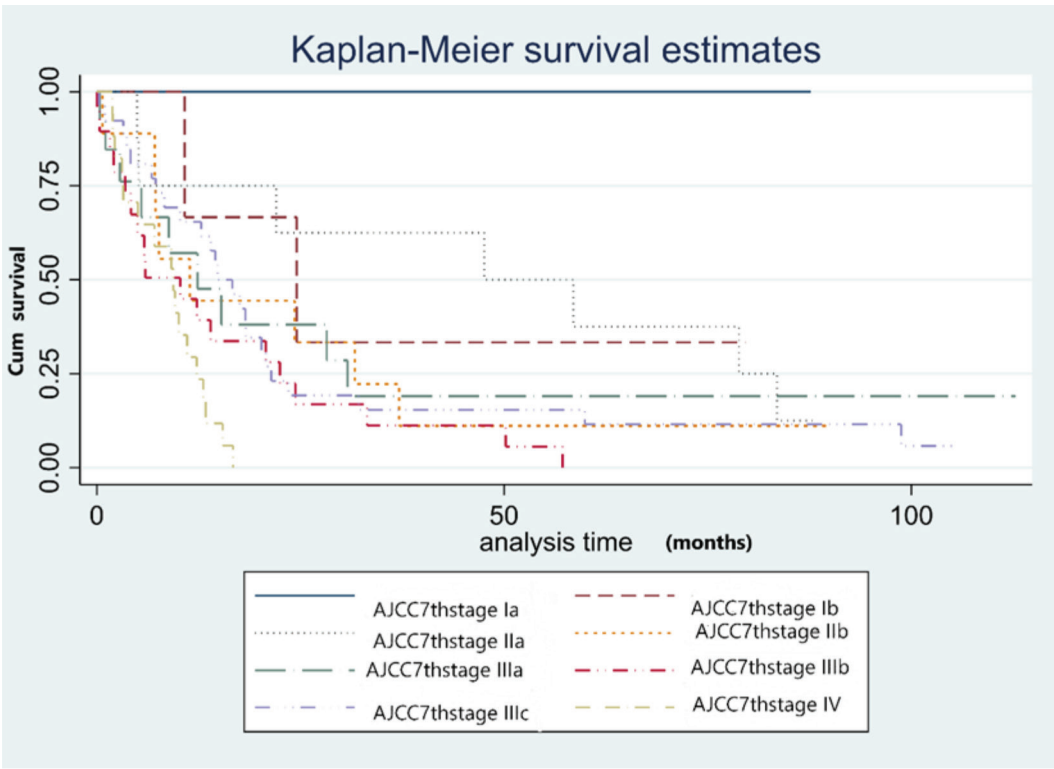

Figure 2 Survival gastric cancer patients by staging AJCC7th
Y-axis name: cum survival and X-axis name: time (months)

The clinicopathologic factors (Table 4) were analyzed in univariable Cox regression found that lymph node ratio (LNR) and staging (subgroups of AJCC7th) were associated with poor survival. The mortality risk was increased for patients with LNR ≥ 0.4 (HR 3.96, 95% CI 1.81-8.67, $p = 0.001$). In addition, the mortality risk was 8-fold higher in patients with stage IV (HR 8.41, 95% CI 1.88-37.57, $p = 0.005$) compared to stage I (IA, IB). Other factors, such as age, gender, body mass index (BMI), tumor size, surgical margin, lymphovascular invasion, and intraoperative blood loss had no association with patient survival ($p > 0.05$). Multivariable Cox regression analyses (Table 5) showed that only staging IV (aHR 9.02, 95% CI 1.35-60.20, $p = 0.024$) was significantly associated with survival.

Table 4 Cox univariable regression analysis of clinicopathologic factors

Character	n	Median survival (months)	Time at risk	Incidence rate/100	Crude HR (95% CI)	*p*-value
Gender						
Male	66	14.6	1,517.3	3.76	1	
Female	30	9.1	635.3	4.41	1.21 (0.76 - 1.90)	0.421
Age						
> 60	40	12.4	1,050.4	3.52	1	
≤ 60	56	11.4	1,102.2	4.35	0.87 (0.56 - 1.34)	0.520
BMI (kg/m²)						
< 18.5	39	10.3	782.6	4.60	1.29 (0.76 - 2.21)	0.344
18.5 - < 23	26	15.4	649.1	3.54	1	
> 23	13	15.3	355.8	3.09	0.92 (0.44 - 1.89)	0.813
Tumor size cm						
≤ 5	41	10.8	896.6	4.13	1	
> 5	55	14.0	1,256.0	3.82	1.17 (0.71 - 1.92)	0.708
Surgical margin						
Positive	13	11.4	150.2	7.99	1	
Negative	83	13.1	2,002.4	3.65	0.62 (0.33 - 1.14)	0.125
Lymphovascular invasion, n = 70						
No	10	14.0	323.5	2.47	1	
Yes	60	12.3	1,284.5	4.13	1.49 (0.71 - 3.15)	0.294
Blood loss, cc.						
< 400	64	12.3	1,649.3	3.33	1	
≥ 400	32	14.6	503.3	5.96	1.39 (0.88 - 2.18)	0.156
LNR						
0	12	24.3	515.4	1.55	1	
< 0.13	14	33.2	516.7	2.13	1.35 (0.54 - 3.36)	0.519
≥ 0.13 - < 0.4	18	13.4	435.0	3.68	2.04 (0.86 - 4.81)	0.104
≥ 0.4	47	9.6	577.0	7.80	3.96 (1.81 - 8.67)	0.001
Staging AJCC7th (4major subgroups)						
I (IA, IB)	4	24.5	202.6	0.99	1	
II (IIA, IIB)	17	24.3	605.3	2.48	2.34 (0.54 - 10.26)	0.258
III (IIIA, IIIB, IIIC)	58	14.0	1,200.1	4.25	3.64 (0.88 - 15.04)	0.074
IV (IV)	17	9.4	144.6	11.76	8.41 (1.88 - 37.57)	0.005

BMI, body mass index (kg/m²); LNR, lymph node ratio; AJCC7th, American Joint Committee on Cancer 7th edition

Table 5 Cox multivariable regression analysis of clinicopathologic factors

Character	Crude HR (95% CI)	Adjusted HR (95% CI)	*p*-value
Age			0.296
≥ 60	1	Ref.	
< 60	0.87 (0.56 - 1.34)	1.37 (0.76 - 2.47)	
BMI (kg/m²)			0.284
< 18.5	1.29 (0.76 - 2.21)	1.57 (0.85 - 2.92)	
18.5 - < 23	1	Ref.	
≥ 23	0.92 (0.44 - 1.89)	1.59 (0.71 - 3.53)	
Tumor size, cm.			0.772
≤ 5	1	Ref.	
> 5	1.17 (0.71 - 1.92)	0.92 (0.51- 1.64)	
Surgical margin			0.212
2 = positive = < 1 mm	1	Ref.	
1 = negative = > 1 mm	0.62 (0.33 - 1.14)	0.61 (0.29 - 1.29)	
LNR			0.122
1 = 0	1	Ref.	
2 = < 0.13	1.35 (0.54 - 3.36)	1.06 (0.22 - 5.09)	
3 = > 0.13 - < 0.4	2.04 (0.86 - 4.81)	1.91 (0.45 - 8.05)	
4 = > 0.4	3.96 (1.81 - 8.67)	2.48 (0.56 - 10.85)	
Staging (AJCC7th) subgroup			0.024
1	1	Ref.	
2	2.34 (0.54 - 10.26)	1.64 (0.33 - 8.19)	
3	3.64 (0.88 - 15.04)	3.95 (0.64 - 24.25)	
4	8.41 (1.88 - 37.57)	9.02 (1.35 - 60.20)	

BMI, body mass index (kg/m²); LNR, lymph node ratio; AJCC7th, American Joint Committee on Cancer 7th edition

Discussion

5-year survival rate was highest in Japan (60-70.5%),[3-4] while western reported 10%-25%.[5-6] The present study demonstrated that 5-year survival rate (12%). There was study reported that early stage gastric cancer detection had 5-year survival rate over 90%.[14] In our study nearly 80% of patients were in stage III, and IV. A study in university institution from Thailand showed that 5-year survival rate was high (59%) benefit clearly in stage II, IIIA (75%, 78% respectively), even though had 66% of patients in stage III, and IV.[7] We found that all patients (100%) in Thai study had D2 gastrectomy compared to present study had only 12.5%. The number of lymph node yield is important in survival. A study reported at least 40 lymph nodes yield from lymph node dissection in gastrectomy improved survival 7.6% (for T1/2N0), 5.7% (for T1/2N1), 11% (for T3N0), and 7% (for T3N1).[11] Also, for accurate staging at least 16 retrieved lymph nodes needed and at least 24 nodes yield reduced the risk of locoregional recurrence.[15-16] In our study average lymph node yield was 16.5 nodes. In western, postoperative morbidity was high in D2 gastrectomy patients compared to D1 gastrectomy (43 vs 25%, $p < 0.001$) and hospital mortality in D2 gastrectomy group also higher than D1 gastrectomy (10 vs 4%, $p = 0.004$) which contrast to Japan studies reported mortality rate of 2-3%.[17-19] A study from Thailand also reported low hospital morbidity (17%) and no mortality compared to western.[7] In present study showed postoperative complication was 22.9% higher than Japanese report and lower than western reports. We found explanation that only 12.5% of D2 gastrectomy was performed in our study, and the BMI in Thai patients is low compare to Western patients. In our study showed pulmonary infection, anastomosis leakage, and wound

infection were common report, but cardiovascular and pulmonary complication can lead to hospital mortality. In current study, univariable Cox regression showed lymph node ratio (LNR ≥ 0.4) and stage IV (subgroups of AJCC7th) were independent prognostic factor. A study demonstrated that the number of retrieved lymph node was an independent prognostic factor and a larger number of lymph nodes can increase 5-year overall survival rate.[11] In the 7th Union for International Cancer Control (UICC)/American Joint Committee on Cancer (AJCC) tumor, lymph node, metastasis (TNM) staging system published in 2010, requires that at least 15 lymph nodes be examined to get accurate staging. The phenomenon of stage migration is happened by an insufficient number of lymph nodes examined.[20] LNR was used to reduce stage migration, even in the case of limited lymph node dissection and also showed that LNR was an independent prognostic factor.[20-23] Cox multivariable regression analysis in the present study demonstrated only stage IV (subgroups of AJCC7th) was clearly independent prognostic factor. In present study showed that gross peritoneal metastasis was the most common found. A study showed peritoneal metastasis, vascular invasion, lymphatic invasion were independent prognostic factors for survival in stage IV and positive peritoneal washing cytology is predictor of peritoneal recurrence.[6-7,24-25] There are several modalities for liver metastasis treatment to improve survival rate such as hepatectomy if possible or inoperable patients, transcatheter arterial chemoembolization (TACE), systemic chemotherapy, microwave coagulation therapy (MCT), or immunotherapy were introduced. The prognosis is still poor because single liver metastasis is infrequent.[24] A study showed patients with peritoneal metastasis and liver metastasis had 5-year survival rate 16.2%, 0.0% respectively.[24] In present study, there was no 5-year survival rate in both groups. There was study showed BMI (underweight and overweight/obese patients) was associated with poor survival rate contrast to the present study found that no association with survival.[9] However, nutritional status should be optimized in high-risk patients for better outcome.[9] A Japanese study reported that lymphovascular invasion (LVI) was an independent prognostic factor in advanced gastric cancer with lymph node metastasis.[26] The explanation from study, lymph nodes had much blood flow through the import and export lymph vessels, believed that metastases to the lymph nodes may be derived through routes other than the lymph flow.[26] In present study showed 85.7% of patients had LVI, and had no association between LVI and survival. The present study has a clinical limitation. It was a retrospective study with a relatively small sample size, larger population study is needed.

Conclusion

The present study demonstrates 5-year survival rates was 12% and clinical stage IV is the independent prognostic factor associated with poor survival outcome. Improving therapeutic outcomes requires early diagnosis and careful surgery.

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REFERENCES

1. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin 2021;71:209-49.
2. National Cancer Institute of Thailand. Cancer in Thailand. Vol. III, 1995-1997. Bangkok: Bangkok Medical Publisher; 2000.
3. Asaka M, Mabe K. Strategies for eliminating death from gastric cancer in Japan. Proc Jpn Acad Ser B Phys Biol Sci 2014;90:251-8.
4. Maruyama K, Sasako M, Kinoshita T, et al. Pancreas-preserving total gastrectomy for proximal gastric cancer. World J Surg 1995;19:532-6.
5. Noguchi Y, Yoshikawa T, Tsuburaya A, et al. Is gastric carcinoma different between Japan and the United States? Cancer 2000;89:2237-46.
6. Hundahl SA, Phillips JL, Menck HR. The National Cancer Data Base Report on poor survival of U.S. gastric carcinoma patients treated with gastrectomy: Fifth Edition American Joint Committee on Cancer staging, proximal disease, and the "different disease" hypothesis. Cancer 2000;88:921-32.
7. Euanorasetr C, Lertsithichai P. Results of D2 gastrectomy for gastric adenocarcinoma: 10-year experience in Thai patients. J Med Assoc Thai 2007;90:291-300.
8. Liang YX, Deng JY, Guo HH, et al. Characteristics and prognosis of gastric cancer in patients aged ≥ 70 years. World J Gastroenterol 2013;19:6568-78.
9. Kim EY, Jun KH, Kim SY, et al. Body mass index and skeletal muscle index are useful prognostic factors for overall survival after gastrectomy for gastric cancer. Medicine (Baltimore) 2020;99:e23363.
10. Tamagawa H, Aoyama T, Kano K, et al. The Impact of Intraoperative Blood Loss on the Long-term Prognosis after Curative Resection for Borrmann Type IV Gastric Cancer: A Retrospective Multicenter Study. Anticancer Res 2020;40:405-12.
11. Smith DD, Schwarz RR, Schwarz RE. Impact of total lymph

node count on staging and survival after gastrectomy for gastric cancer: data from a large US-population database. J Clin Oncol Off J Am Soc Clin Oncol 2005;23:7114-24.
12. Hou Y, Wang X, Chen J. Prognostic significance of metastatic lymph node ratio: the lymph node ratio could be a prognostic indicator for patients with gastric cancer. World J Surg Oncol 2018;16:198.
13. Liu JY, Peng CW, Yang XJ, et al. The prognosis role of AJCC/UICC 8th edition staging system in gastric cancer, a retrospective analysis. Am J Transl Res 2018;10:292–303.
14. Kaneko E, Nakamura T, Umeda N, et al. Outcome of gastric carcinoma detected by gastric mass survey in Japan. Gut 1977;18:626-30.
15. Edge SB, Compton CC. The American Joint Committee on Cancer: the 7th Edition of the AJCC Cancer Staging Manual and the Future of TNM. Ann Surg Oncol 2010;17:1471-4.
16. Schwarz RE, Zagala-Nevarez K. Recurrence patterns after radical gastrectomy for gastric cancer: prognostic factors and implications for postoperative adjuvant therapy. Ann Surg Oncol 2002;9:394-400.
17. Bonenkamp JJ, Songun I, Hermans J, et al. Randomised comparison of morbidity after D1 and D2 dissection for gastric cancer in 996 Dutch patients. Lancet Lond Engl 1995;345:745-8.
18. Fujimaki M, Soga J, Wada K, et al. Total gastrectomy for gastric cancer. Clinical considerations on 431 cases. Cancer 1972;30:660-4.
19. Yamada E, Miyaishi S, Nakazato H, et al. The surgical treatment of cancer of the stomach. Int Surg 1980;65:387-99.
20. de Manzoni G, Verlato G, Roviello F, et al. The new TNM classification of lymph node metastasis minimises stage migration problems in gastric cancer patients. Br J Cancer 2002;87:171-4.
21. Pedrazzani C, Sivins A, Ancans G, et al. Ratio Between Metastatic and Examined Lymph Nodes (N Ratio) May Have Low Clinical Utility in Gastric Cancer Patients Treated by Limited Lymphadenectomy: Results from a Single-Center Experience of 526 Patients. World J Surg 2010;34:85-91.
22. Inoue K, Nakane Y, Iiyama H, et al. The superiority of ratio-based lymph node staging in gastric carcinoma. Ann Surg Oncol 2002;9:27-34.
23. Siewert JR, Böttcher K, Stein HJ, et al. Relevant prognostic factors in gastric cancer: ten-year results of the German Gastric Cancer Study. Ann Surg 1998;228:449-61.
24. Yagi Y, Seshimo A, Kameoka S. Prognostic factors in stage IV gastric cancer: univariate and multivariate analyses. Gastric Cancer Off J Int Gastric Cancer Assoc Jpn Gastric Cancer Assoc 2000;3:71-80.
25. Bando E, Yonemura Y, Takeshita Y, et al. Intraoperative lavage for cytological examination in 1,297 patients with gastric carcinoma. Am J Surg 1999;178:256-62.
26. Fujikawa H, Koumori K, Watanabe H, et al. The Clinical Significance of Lymphovascular Invasion in Gastric Cancer. In Vivo 2020;34:1533-9.

บทคัดย่อ

อัตราการรอดชีวิตของผู้ป่วยมะเร็งกระเพาะอาหารที่ได้รับการผ่าตัดหวังผลหายขาดของโรงพยาบาลมหาราชนครราชสีมา

กีรศักดิ์ จัตวัฒนกุล, พบ.

หน่วยศัลยกรรมทั่วไป กลุ่มงานศัลยกรรม โรงพยาบาลมหาราชนครราชสีมา

ความเป็นมา: ถึงแม้อุบัติการณ์การเกิดมะเร็งกระเพาะจะลดลงแต่ก็เป็นมะเร็งที่มีอัตราการเสียชีวิตของผู้ป่วยที่อยู่ลำดับต้นๆ อัตราการรอดชีวิตยังคงมีความแตกต่างระหว่างภูมิภาคโดยพบว่ามีอัตรารอดชีวิตที่สูงในเอเชียตะวันออกและรองลงมาในตะวันตกและพบว่ามีหลายปัจจัยเสี่ยงทีผลต่ออัตราการรอดชีพ

วัตถุประสงค์: เพื่อศึกษาอัตราการรอดชีวิต ของผู้ป่วยมะเร็งกระเพาะอาหารที่ได้รับการผ่าตัดหวังผลหายขาด และปัจจัยเสี่ยงที่มีผลต่ออัตราการรอดชีวิตของมะเร็งกระเพาะอาหาร

วิธีการศึกษา: ศึกษาข้อมูลจากเวชระเบียนย้อนหลังผู้ป่วยมะเร็งกระเพาะอาหารที่ได้รับการผ่าตัดหวังผลหายขาดที่โรงพยาบาลมหาราชนครราชสีมาในช่วงเวลา 1 มกราคม 2555 ถึง 31 ธันวาคม 2559 อัตราการรอดชีวิต (survival rate) วิเคราะห์โดย Kaplan-Meier curve และวิเคราะห์ปัจจัยที่มีผลต่อการรอดชีวิตโดย Cox proportional hazard regression แสดงผลลัพธ์ hazard ratios ค่า *p*-values และ 95% confidence intervals กำหนดระดับนัยสำคัญ 0.05

ผลการศึกษา: ในการศึกษานี้มีผู้ป่วยทั้งหมด 96 ราย เพศชายร้อยละ 68.7 อายุเฉลี่ยเท่ากับ 64 ปี (SD = 12.5) มะเร็งพบมากบริเวณ 1 ส่วน 3 ล่างของกระเพาะอาหารร้อยละ 68.7 และมีผู้ป่วยอยู่ในระยะ 3 มากสุดร้อยละ 60.4 พบการผ่าตัดแบบ total gastrectomy มากสุดร้อยละ 40.3 มีอัตราแทรกซ้อนหลังการผ่าตัดร้อยละ 22.9 และมีอัตราเสียชีวิตหลังผ่าตัดร้อยละ 4.2 ในการศึกษานี้พบว่าค่ามัธยฐานเวลาการรอดชีวิต (Median survival time) เท่ากับ 12.4 เดือน และอัตราการรอดชีวิตที่ 1, 3, 5 ปีเท่ากับร้อยละ 53% (95% CI 42% - 62%), 18% (95% CI 11% - 27%), 12% (95% CI 6% - 19%) ตามลำดับ ปัจจัยเสี่ยงที่สัมพันธ์กับการรอดชีวิต (Independent factors) คือ มะเร็งระยะที่ 4 (Stage IV) (aHR 9.02, 95% CI 1.35 - 60.20, $p = 0.024$)

สรุปผลการศึกษา: ในการศึกษานี้พบว่าพบว่ามะเร็งระยะที่ 4 ผลต่อการรอดชีวิตโดยรวมอย่างมีนัยสำคัญ

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Original Article

Colonoscopic Perforation Incidence and Risk Factors in Rajavithi Training Hospital

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Abstract

Background: The colonoscope has become a standard tool for diagnosing and treating pathological diseases of the colon. Colonoscopic perforation is one of the serious consequences associated with colonoscopy, and as a result, it may result in a high rate of morbidity and mortality.

Objectives: This study aims to determine the incidence and risk factors associated with colonoscopic perforation in a training institution.

Methods: A retrospective review of medical records was performed for patients undergoing colonoscopy in Rajavithi Hospital between 2009 and 2019, total 10.057 patient. The patient's demographic data, indication for colonoscopy, quality of bowel preparation, endoscopic procedure, perforation, and diagnostic were recorded.

Results: Between 2009 and 2019, 12,239 colonoscope was performed and 2,182 colonoscopy was excluded. In total 0.71% (71/10,057) colonoscopic perforation was occurred. Multivariate logistic regression analysis reveals that previous gynecologic surgery (OR 41.1, *p*-value < 0.001, 95% CI 16.40-102.73), general anesthesia (OR 7.74, *p*-value 0.016, 95% CI 1.46-40.97), trainee (OR 20.74, *p*-value < 0.001, 95% CI 11.25-38.35) and polypectomy (OR 6.08, *p*-value < 0.001, 95% CI 3.15-11.70), EMR (OR 23.32, *p*-value < 0.001, 95% CI 6.02-90.41) and endoscopic subepithelial dissection (OR 89.99, *p*-value < 0.001, 95% CI 12.74-135.46) were significant.

Conclusion: Patients tend to have a higher colonoscopic perforation rate when they have a history of previous gynecological surgery or general anesthesia the colonoscopy to be performed by a trainee or polypectomy or endoscopic submucosal resection (EMR) or endoscopic submucosal dissection (ESD) to be performed. Even though we're aware of the risk factor, we must nevertheless handle each case with care and solely focus on high-risk populations in our practice.

Keywords: Colonoscopic perforation, Risk factors, Incidence, Training center, Colonoscope

Introduction

Colonoscopy become a common procedure to diagnosis and treatment pathological conditions in the colon. Amount the complication, perforation is serious so it may cause high morbidity and mortality. Aras et al reported morbidity and mortality rates in the large series were ranged between 21% to 53% and 0% to 26%, successively.[1] WSES guideline 2017[2] reported the incidence is estimated to be 0.016-0.8% for diagnostic colonoscopies and 0.02–8% for therapeutic colonoscopies. WSES guideline 2017[2] and Cai et al[3] suggested three treatment methods: conservative, endoscopic, and surgical (laparoscopic and open surgery). The decision of management depended on the type of perforation, timing of detection, patient's condition, and the operator. Around 45 to 60 percent of colonoscopic perforation

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was identified during the colonoscopy, but a significant proportion of patients had a delayed diagnosis. In this case, (delayed detection) colonic perforations may lead to the development of secondary peritonitis and sepsis, which may need a more aggressive treatment and carry a higher morbidity including stroma rate[3] and mortality. Since the prevention and early detection is the key to management of perforation, the purpose of this study is to identify the factors that lead to colonoscopy perforation. This information may be used to design safety protocols for colonoscopies and post-operative monitoring in colonoscopy patients, particularly in high-risk populations.

This study's major objective is to identify a risk factor for colonoscopic perforation. Many studies of a similar kind have been conducted elsewhere, but only a handful in Thailand.

Materials and Methods

Population cohort

Patients who had colonoscopy at Rajavithi Hospital between 2009 and 2019, total 10,057 patient. Generally, we advise discontinuing antiplatelet and anticoagulant medications before to elective colonoscopies. Our plan for bowel preparation consisted of a soft diet without vegetable and meat two days prior to colonoscopy and clear liquid diet with three liters of a polyethylene glycol (PEG)-based solution in the evening one day prior the colonoscopy and one liter in the morning of the day of the colonoscopy. Most of patient had colonoscopy in standard left lateral decubitus and forehead to knees. We recommend discontinuing antiplatelet and anticoagulant medications prior to elective colonoscopy. Colonoscopy was often performed under intravenous sedation with 25 to 50 milligrams of pethidine and 2.5 to 5 milligrams of midazolam, with the dose according on age and comorbidities. And in cases of general anesthesia, anesthesiologists adjusted medication dosages for each patient.

Data collection

Data was extract from medical sheet records and electronic records. The patient characteristic, endoscopic information, surgical intervention and progression during admission were recorded. We enrolled the patients who had colonoscopy at Rajavithi Hospital between 2009 and 2019. Patient with unavailable data or missing data, and early case termination were excluded.

Analysis

Patient was dividing into perforation group and non-perforation group. Data was analyzed with IBM SPSS version 22.0. Mean, SD, percent, Pearson's chi-squared, and Fisher's exact test were used for the univariate analysis. To evaluate the relationship between explanatory and outcome variables. In multivariate analysis, both the factor that had a statistically significant correlation with colonic perforation in univariate analysis and the factor that was considered to have a link were analyzed. with p-value of < 0.05 considered to be significant.

Results

There were 10,057 patients proceeding to the final analysis. Overall patient mean age was 58.60 ± 10.79 years, and 57 percent of patient was male. Incidence of colonoscopic perforation was 0.71 percent (71/10,057) (Table 1).

In univariate analysis factor that significant is history of previous surgery, anesthesia, endoscopist and indication of colonoscopy which all had p-value < 0.001. In our study age, gender and quality of bowel preparation were not significant.

History of previous gynecological surgery (p-value < 0.001, OR 41.05, 95% CI 16.404-102.734), general anesthesia (p-value 0.016, OR 7.74, 95% CI 1.46-40.97) and perform by trainee (p-value < 0.001, OR 20.74, 95% CI 11.25-38.25) (Table 2), procedure also contributed to the risk; endoscopic submucosal dissection (p-value < 0.001, OR 89.99, 95% CI 12.74-135.46), EMR (p-value < 0.001, OR 23.32, 95% CI 6.02-90.41), EMR (p-value < 0.001, OR 23.32, 95% CI 6.02-90.41) and polypectomy (p-value < 0.001, OR 6.08, 95% CI 3.15-11.70), (Table 3). In this research, patients who underwent argon plasma coagulation, dilatation, endoscopic ultrasound-guided fine-needle aspiration, and rubber band ligation did not have perforation.

Additionally, we found the perforation site at intraperitoneum rectum 7 (10%), sigmoid 33 (46%), descending colon 6 (8%), transverse colon 5 (7%), ascending colon 4 (6%), ceacum 11 (15%), and ileum 5 (7%), (Table 4).

Table 1 Baseline patient characteristic

Characteristics	Perforation group 71 (%)	Non-perforation group 9,986 (%)	*p*-value
Age (58.60 ± 10.79)	58.59 ± 10.80	57.83 ± 11.55	0.1
Sex			0.39
Male	37 (0.6)	5,710 (99.4)	
Female	34 (0.8)	4,276 (99.2)	
Previous surgery			< 0.001*
Non	51 (0.6)	8,960 (99.4)	
Abdomen	0 (0.0)	752 (100)	
Gynecologic	18 (34)	35 (66)	
Colorectal	2 (0.9)	227 (99.1)	
Thoracic	0 (0.0)	12 (100)	
Anesthesia			< 0.001*
Sedate	60 (0.6)	9,981 (99.4)	
General anesthesia	11 (68.8)	5 (31.3)	
Endoscopist			< 0.001*
Staff	35 (0.4)	9,484 (99.6)	
Trainee	36 (6.7)	502 (93.3)	
Quality of bowel preparation			0.463
Clear	55 (0.7)	8,079 (99.3)	
Poor	16 (0.8)	1,907 (99.2)	
Indication			< 0.001*
Diagnostic	56 (0.6)	9,896 (99.4)	
Therapeutic	15 (14.3)	90 (85.7)	
Endoscopic procedures			< 0.001*
Non	15 (0.2)	7,150 (99.8)	
Polypectomy	37 (2.0)	1,850 (98.0)	
EMR	6 (8.3)	66 (91.7)	
ESD	13 (59.1)	9 (40.9)	
Biopsy	0 (0.0)	850 (100)	
APC	0 (0.0)	27 (100)	
Dilatation	0 (0.0)	24 (100)	
EUS & FNA	0 (0.0)	4 (100)	
RBL	0 (0.0)	6 (100)	

SD: Standard deviation; EMR: Endoscopic mucosal resection; ESD: Endoscopic submucosal resection; APC: Argon plasma coagulation; EUS & FNA: Endoscopic ultrasound and fine needle aspiration; RBL: Rubber band ligation

Table 2 Multivariate logistic regression analysis between History of previous surgery and colonoscopic perforation

Characteristics	*p*-value	Odds ratio	95% CI	
			Lower	Upper
History of previous surgery	< 0.001			
Abdomen	0.99	0	0	-
Gynecologic	< 0.001	41.051	16.404	102.734
Colorectal	0.137	3.139	0.696	14.162
Thoracic	0.999	0	0	-
General anesthesia	0.016	7.74	1.462	40.966
Perform by trainee	< 0.001	20.739	11.245	38.247
Therapeutic as Indication	0.089	4.422	0.795	24.587

Table 3 Multivariate logistic regression analysis between endoscopic procedure and colonoscopic perforation

Characteristics	*p*-value	Odds ratio	95% CI	
			Lower	Upper
Endoscopic procedure	< 0.001			
Polypectomy	< 0.001	6.076	3.155	11.701
EMR	< 0.001	23.321	6.016	90.405
ESD	< 0.001	89.994	12.745	635.456
Biopsy	0.99	0	0	-
APC	0.998	0	0	-
Dilatation	0.998	0	0	-
EUS & FNA	0.999	0	0	-
RBL	0.999	0	0	-

EMR: Endoscopic mucosal resection; ESD: Endoscopic submucosal resection; APC: Argon plasma coagulation; EUS & FNA: Endoscopic ultrasound guide fine-needle aspiration; RBL: Rubber band ligation

Table 4 Perforation site

Perforation site	Indication	
	Diagnostic n (%)	Therapeutic n (%)
Intraperitoneal rectum	4 (7.1)	3 (20)
Sigmoid	32 (57.1)	1 (6.7)
Descending colon	6 (10.7)	0
Splenic flexure	0	1 (6.7)
Transverse colon	1 (1.8)	1 (6.7)
Hepatic flexure	0	2 (13.3)
Ascending colon	0	4 (26.7)
Ceacum	8 (14.3)	3 (20)
Ileum	5 (8.9)	0

Discussion

In general, colonoscopic perforation increases morbidity and mortality. As we mentioned earlier regarding management, in the minimally invasive era, with the advancement of technologies, endoscopic and laparoscopic management have become more prevalent and widely accepted. However, their use is typically limited to intra-colonoscopic and early detection cases, while open surgery remains an option for late detection and severe cases. It is obvious that preventing perforation is the best course of action, but since this was unattainable, one of the solutions to this disaster was to identify high-risk factors in order to establish a protocol that may help in the prevention or early diagnosis of the case.

In our study age and gender did not have a statistical different in perforation and non- perforation group. Even though in our study we have more female in perforation group, but it was no statistically significant in perforation comparing to male, we may need more population to show a statistically significant result since the rate of perforation is relatively low on its own or gender was not a significant factor. Some studies also show an association between age, gender, and colonoscopic perforation, such as, Cha RR[4] found that female and older age trend to have higher perforation rate. Another report by Waye JD[5] was describe that women trend to have longer colon that pack in smaller abdominal cavity resulting in many twists and turns in colon, they mention about previous pelvic surgery and diverticular disease also increase perforation rate. Cooper GS[6] report that using of anesthesia service has higher risk of any complication and perforation rate (OR, 1.07; 95% CI 1.00-1.15). Anesthesia has a direct impact in colonoscopy outcomes may, in the absence of patient feedback, increased colonic-wall tension from colonoscopy pressure may not be identified by the endoscopist.[7] Usually, general anesthesia was done in group of difficult process or non-cooperative patient thus the complexity of procedure itself would be a cause of perforation. In this study, however, a multivariate analysis demonstrated that general anesthesia was an independent risk. One study in France[8] reported that the relationship between the endoscopist's age and the perforation rate tends to be U-shaped with a higher risk for younger and older physicians, after adjustment for the number of procedures performed each year. This result may be the result of a cautious intubation of novice and experienced operator tend to do more complex and challenging procedure. In addition, doing less than 300 colonoscopies annually was a risk factor for perforation, and high volume endoscopists may minimize perforation rates. Thus, high risk patient colonoscopy should be performed by experience endoscopist or Trainer.[9] Poor bowel preparation is known to be related with technical difficulties and may had consequently a greater complication risk, but in our research, we did not see a statistically significant difference between the two groups. In our study perforation rate were 0.71 percent (71/10,057), 0.56 percent (56/9,952), 14.28 percent (15/105) for overall, diagnostic and therapeutic colonoscopies respectively. In therapeutic group we have 10 polypectomy, 19 endoscopic mucosal resection, 21 endoscopic submucosal dissection, 25 argon plasma coagulation, 24 dilatation and 6 rubber band ligations. Study reported in 1998 by Ch. Wullstein et al.[10] reported the incidence of perforation is 0.1-0.8% for diagnostic colonoscopy and 0.15-3% for therapeutic colonoscopy, in 2016 systematic review of post-colonoscopy complication done by Ankie R. et al.[11] reported overall peroration rate was 0.05 percent (0.08 percent in therapeutic group, and 0.04 percent in diagnostic group). One of the largest data reported by Edmund Derbyshire et al.[12] reported 263,129 colonoscopies were analyzed, and the rate of perforation was 0.06 percent and 70.1 percent of perforations occurred during therapeutic colonoscopies, the same as our report that therapeutic colonoscopies have higher risk of perforation more than diagnostic colonoscopies. In our study the perforation were 1.96 percent (37/1,887), 8.3 percent (6/72) and 59% (13/22) for Polypectomy, endoscopic mucosal resection and ESD respectively. In our report the perforation rate quite higher that the reports that reported by Keisei T. et al.[13] reported perforation rate for 0.58 percent for endoscopic mucosal resection and 14 percent for and endoscopic submucosal dissection. In our series we had a successfully endoscopic management 6.7 percent (1/15), 2.9 percent (2/37), 16.7 percent (1/6) and 53.8 percent (7/13) in colonoscopy, polypectomy, endoscopic mucosal resection and endoscopic submucosal dissection respectively. Our study's mortality rate was 7% (5/71) and comparable to WSES[2] 5-25%. The perforation site reported by IqBal CW. et al.[14] Were Sigmoid/rectosigmoid (52%), cecum (17%), ascending colon (14%), descending colon (8%), transverse colon (7%) and rectum (1%) and in our report, we found the perforation site at intraperitoneum rectum 7 (10%), sigmoid 33 (46%), descending colon 6 (8%), transverse colon 5 (7%), ascending colon

4 (6%), ceacum 11 (15%), ileum 5 (7%), (Table 4). Sigmoid colon has the greatest risk of perforation. This is because diseases such as diverticulitis and gynecologic illness (with or without a history of pelvic surgery) may produce pelvic inflammation and adhesion, resulting in sigmoid angulation and tortuousness.

The limitation of this research was the lack of particular polypectomy technique and its specifics including other substantial factor such as case volume of trainee, bowel preparation scale and BMI of patient were not included in this study.

Conclusion

Colonoscopic perforation is has a great morbidity and mortality. We all do not want this to occur in our practice, thus it is essential to train under supervision of an experienced operator and practice carefully. Finally, patients tend to have a higher colonoscopic perforation rate when they have a history of previous gynecological surgery, general anesthesia, the colonoscopy to be performed by a trainee, polypectomy or endoscopic mucosal resection or endoscopic submucosal resection to be performed. In the high-risk category, we should be on the lookout for any warning signs and initiate an early evaluation for prompt treatment.

REFERENCES

1. Aras A, Oran E, Seyit H, et al. Colonoscopic Perforations, What is Our Experience in a Training Hospital? Surg Laparosc Endosc Percutan Tech. 2016;26:44-8.
2. de'Angelis N, Di Saverio S, Chiara O, et al. 2017 WSES Guidelines for the Management of Iatrogenic Colonoscopy Perforation. World J Emerg Surg. 2018;13:5.
3. Cai SL, Chen T, Yao LQ, et al. Management of Iatrogenic Colorectal Perforation: From Surgery to Endoscopy. World J Gastrointest Endosc. 2015;7:819-23.
4. Cha RR, Kim HJ, Lee CM, et al. Clinical Characteristics and Outcome of Iatrogenic Colonic Perforation Related to Diagnostic vs. Therapeutic Colonoscopy. Surg Endosc. 2022;36:5938-46.
5. Waye JD. Difficult Colonoscopy. Gastroenterol Hepatol (N Y). 2013;9:676-8.
6. Cooper GS, Kou TD, Rex DK. Complications Following Colonoscopy with Anesthesia Assistance: A Population-Based Analysis. JAMA Intern Med. 2013;173:551-6.
7. Wernli KJ, Brenner AT, Rutter CM, et al. Risks Associated with Anesthesia Services During Colonoscopy. Gastroenterology. 2016;150:888-94.
8. Chukmaitov A, Bradley CJ, Dahman B, et al. Association of Polypectomy Techniques, Endoscopist Volume, and Facility Type with Colonoscopy Complications. Gastrointest Endosc. 2013;77:436-46.
9. Laanani M, Coste J, Blotière PO, et al. Patient, Procedure, and Endoscopist Risk Factors for Perforation, Bleeding, and Splenic Injury after Colonoscopies. Clinical Gastroenterology and Hepatology. 2019;17:719-727.e13.
10. Wullstein C, Köppen M, Gross E. Laparoscopic Treatment of Colonic Perforations Related to Colonoscopy. Surg Endosc. 1999;13:484-7.
11. Reumkens A, Rondagh EJ, Bakker CM, et al. Post-Colonoscopy Complications: A Systematic Review, Time Trends, and Meta-Analysis of Population-Based Studies. Am J Gastroenterol. 2016;111:1092-101.
12. Derbyshire E, Hungin P, Nickerson C, et al. Colonoscopic Perforations in the English National Health Service Bowel Cancer Screening Programme. Endoscopy. 2018;50:861-70.
13. Taku K, Sano Y, Fu KI, et al. Iatrogenic Perforation Associated with Therapeutic Colonoscopy: A Multicenter Study in Japan. J Gastroenterol Hepatol. 2007;22:1409-14.
14. Iqbal CW, Cullinane DC, Schiller HJ, et al. Surgical Management and Outcomes of 165 Colonoscopic Perforations from a Single Institution. Arch Surg. 2008;143:701-6.

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Original Article

Nonsurgical Management of Partial Adhesive Small Bowel Obstruction with Bisacodyl Suppository Combine Intravenous Metoclopramide Therapy: A Randomized Control Trial

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Abstract

Background and Objective: Patients with clinical feature of small bowel obstruction and present of previous abdominal surgery should be suspected of adhesive small bowel obstruction especially midline incision. Previous study of oral laxative drug with digestive agent was a conservative treatment that this approach is associated with the hospital stays and risk of delayed surgery. The aims of the present randomized controlled trial study were to investigate a combining standard conservative treatment using Bisacodyl suppository with intravenous metoclopramide for partial adhesive small bowel obstruction comparing with the control group which nothing by mouth, intravenous hydration and nasogastric tube decompression.

Materials and Methods: 120 patients admitted between January 2019 - December 2020 with symptom and sign suggestive of partial adhesive small bowel obstruction were randomized to receive either the control group (nothing by mouth, intravenous hydration and nasogastric tube decompression) or treatment group (Bisacodyl suppository and intravenous metoclopramide). The primary outcome included time to first flatus and defecation, number of successfully treatment without surgery, and length of hospital stay were recorded.

Results: A total of 120 patients were included in this study, 60 patients in each treatment group and control group. The treatment group was more effective than the control group in the time of flatus and defecation ($p < 0.001$), and lower number surgical need than another group with statistic significantly ($p < 0.05$). Also, average length of hospital stay in the treatment group was shorter than the control group with statistically significant at $p < 0.001$. There were no statistically significant differences between patients in both groups in terms of age, gender, and type of previous surgical incision as baseline.

Conclusion: Bisacodyl suppository and metoclopramide intravenous injection was safe and effective without complication to use in patients. It was effective in hastening the resolution of conservatively treated partial adhesive small bowel obstruction and shortening the hospital stay.

Keywords: Adhesive small bowel obstruction, Bisacodyl suppository and metoclopramide, Randomized controlled trial, Nonsurgical management

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Introduction

About 95% after abdominal surgery in adult were develop small bowel obstruction and 65% to 75% are cause by adhesion.[1] Conservative management included intravenous hydration, nasogastric tube or long tube decompression and nothing by mouth were successes in 73-90% of case.[2,3] Midline surgical operation associate higher risk of adhesive small bowel obstruction.[4] Laparoscopic surgery may reduce incidence of adhesive small bowel adhesion and incisional herniation.[5] There are many studies to compare traditionally conservative management with gastrointestinal contrast study.[6-10] The study was significantly in management of small bowel obstruction leading to shorter hospital stayed but did not reduce the need for operation.

Few studies of cisapride a prokinetic agent have been in postoperative ileus trial and it has been advantage in reducing hospital stay but it must be used in caution because of cardiovascular adverse effect.[11-12] Metoclopramide is a prokinetic of stomach and small bowel, it acts at the level of acetylcholine and dopamine receptor for stimulating peristalsis but it is contraindication in patients with completed bowel obstruction. Metoclopramide has been very effective in patients of malignant incomplete small bowel obstruction.[13] Previous study of oral laxative drug, digestive agent and defoaming agent (magnesium oxide, Lactobacillus acidophilus and simethicone) it was effective in resolution of conservative treatment in partial adhesive small bowel obstruction and shortening of hospital stay.[14] Rectal suppository laxative was advantage of locally effort on patients. A small number of study of Bisacodyl suppository was used in post operative ileus patients.[15-16] One randomize controlled trial of bisacodyl suppository versus placebo for post operative ileus after elective Colectomy of colon cancer, it seem to be effective in resolving post operative ileus and may decrease the length of hospital stayed without increase risk of postoperative complications.[16] However no randomized studies have been published of both metoclopramide and Bisacodyl suppository in partial adhesive small bowel obstruction.

This study conducted a randomized controlled trial aimed to investigate the conservative treatment using bisacodyl suppository combined with intravenous metoclopramide for partial adhesive small bowel obstruction patients, this study hypothesized that the treatment group may be more effective than the control group in the aspect of the time of flatus and defecation, number of subsequent surgical interventions, the length of hospital stays.

Materials and Methods

Study design

A randomized controlled trial was used to investigate the effect of Bisacodyl suppository combine intravenous metoclopramide therapy for patients with partial adhesive small bowel obstruction. Participants were randomly assigned to one of two groups: Group I (control) received nothing by mouth, intravenous hydration and nasogastric tube decompression and Group II (treatment) received bisacodyl suppository and intravenous metoclopramide. After recruitment and screening of participants, baseline assessment was conducted before the intervention.

Patients and Methods

The inclusion criteria were as following: (1) History of midline surgical wound incision (2) Age > 18 years (3) Clinical symptom and sign compatible with cardinal sign of partial small bowel obstruction such as colicky abdominal pain, abdominal distension, vomiting and obstipation, and (4) Pain film acute abdomen series was shown the dilatation of small bowel loop (small bowel distention > 3 cm) with air fluid level and present of gas in rectum to confirm of partial small bowel obstruction. Exclusion criteria were: (1) Age below 18 years old (2) Clinical suggest of completed small bowel obstruction or strangulation (absence gas in large intestine or rectum, fever or peritonitis) (3) Previous treatment of radiation (4) Post operation within 4 weeks (5) Multiple surgery (more than 2 times) (6) Peritoneal carcinomatosis, and (7) None of midline skin incision such as appendectomy incision or cholecystectomy incision.

All patients arrived in emergency department; inclusion cases were enrolled in this study by emergency staff. Laboratory, plain film acute abdomen or CT scan was performed for evaluated closed loop obstruction or strangulation. At surgical ward the patients were randomized into two group by attending surgeon. Both groups are equal number of patients either control group (patients with intravenous fluid, nothing per oral and nasogastric tube decompression) or treatment group (patients with bisacodyl suppository once daily and intravenous metoclopramide every 8 hour) add to the conservative treatment.

All patients in both groups were followed clinical and repeat abdominal radiography after 24 hour and once daily until obstruction resolved by improved radiographic appearance or passage of flatus and defecation. Nasogastric tube was removed after clinical and radiographic showed resolution of partial adhesive small bowel obstruction was confirmed. Step oral liquid diet to solid soft diet was started. The attending surgeon were assessed discharge criteria as following: (1) Clinical abdominal pain was subsided and solid diet was tolerated (2) Flatus was pass and pain film abdomen showed absence of gas in small bowel and present gas in colon or rectum. If symptom of complications were developed such as fever, leukocytosis, peritonitis or obstruction did not resolve spontaneously after 3 days, then a laparotomy was performed by attending staff decision.

Ethical Considerations

The Ethics committee for medical research approved by IRB protocol and inform consent were written for all patients. Ethical considerations were taken from the ethical committee of Kratumbann Hospital (Registration No: 043/62). The protected samples were obtained as personal information and ethical concerns, which included informed-consent and maintaining confidentiality. The samples had the right to cancel participation in the study at any time without any impact.

Data Collection and Measurements

A randomize controlled clinical trial was performed for all patients who were admitted in Kratumbann Hospital during January 2019 - December 2020 with clinical of partial small bowel obstruction were consider. Baseline data included age, gender, diagnosis, symptom and previous surgery were recorded. The primary outcome was the days of the first passage to flatus and stool were observed. Secondary outcome measures were the length of hospital stayed and number of patients who need operative intervention.

Data Analysis

Data were double entered into the statistical program by research assistants. The outcome measures were presented as means and standard deviations. All analyses were performed on the basis of intention to-treat. Statistic comparative data were analyzed by Chi-square test, Fischer's exact test and independent t-test (p-value < 0.05).

Results

Total of 134 patients with adhesive small bowel obstruction during study period, there were 120 patients fulfilled the inclusion criteria for this study and all research consented were participated, 14 patients were excluded by exclusion criteria (Figure 1). Sixty patients were randomized into conservative group (control group) and sixty patients in the treatment group.

Baseline and demographic data were presented (Table 1). Patients in both groups had similar characteristic and did not differ significantly in gender ratio, age, and type of previous operative incision.

The overall outcome of patients in both groups were present in Table 2. The time of flatus and defecation are the most obvious differences. In the treatment group was higher successful of timing of flatus and defecation before day 3 than the control group with statistic significantly ($p < 0.001$). The average length of hospital stay was shorter in the treatment group (2.55 vs. 4.41 days) than the control group with statistic significantly ($p < 0.001$). The number of surgical needs was lower in the treatment than the control group. There were seven patients who need surgical operation in the treatment group which was lower than 19 patients in the control group with statistic significant difference between two group ($p = 0.047$).

The details of patients showed that 19 patients who required surgical operation in the control group, one patient had small bowel resection due to bowel ischemia. Most common indication for surgery was fail in the conservative treatment after 3 days (n = 18), seven patients in treatment group required operative treatment after failed 3 times of bisacodyl suppository and two patients were successful in Laparoscopic adhesiolysis procedure. During study period was found recurred in three patients after the first obstruction was resolved. Two patients were enrolled as new cases in the same group (conservative group) and one of two patient was failed for conservative treatment then the open adhesiolysis was performed. Other one patient was enrolled in the different group (treatment group) and patient's symptoms was improved before 3 days. The definition of patients with recurrence is the patient who discharge from the hospital more than 7 days and they will count as new cases. There was one patient was readmitted in 72 hours after discharge was excluded.

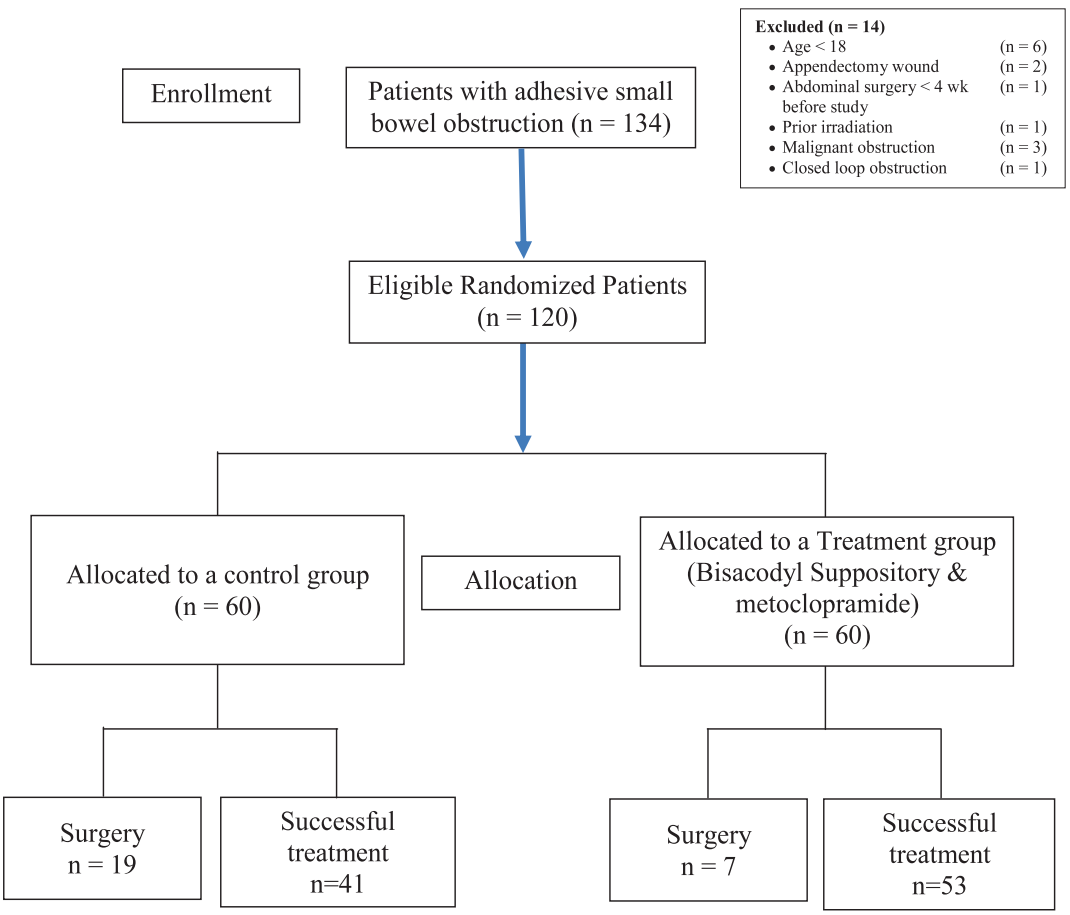

Figure 1 Flow chart of the progression of participants through the phases of the randomized controlled trial (RCT)

Table 1 Baseline and demographic of patient characteristics in the control group (n = 60) and treatment group (n = 60)

Characteristics	Control group (n = 60)	Treatment Group (n = 60)
Gender		
Male: Female	34: 26	32: 28
Age	($\bar{x}$ = 57.58, SD = 20.68, 18-92)	($\bar{x}$ = 52.83, SD = 18.70, 19-92)
Previous Surgery		
Lower line	13	11
Middle line	45	48
Upper line	2	1

Table 2 Comparison of outcomes between the control group and the treatment group

Outcomes	Control group (n = 60)	Treatment Group (n = 60)	*p*-value
Time of flatus			0.001[c*]
Day 3 or before	27	55	
After day 3	33	5	
Time of defecation			0.001[c*]
Day 3 or before	16	50	
After day 3	44	10	
Surgery needed			0.047[a*]
Open adhesiolysis	17	5	
Laparoscopic adhesiolysis	1	2	
Bowel resection	1	0	
Surgical indication			0.012[b*]
Failure of treatment	18	7	
Complication	1	0	0.05
Length of hospital stay	($\bar{x}$ = 7.07, SD = 4.41, 2-30)	($\bar{x}$ = 3.58, SD = 2.55, 2-12)	0.01[c*]

[a] Chi-square test, [b] Fisher's exact test, [c] Independent t-test (*p*-value < 0.05)

No patient was recurrence in same admission and patients was readmitted within 7 days were not count in the new case. No complication from Bisacodyl and metocloplamide used was seen.

Discussion

The results of this study showed the number of patients in the treatment group (Bisacodyl suppository with Metoclopramide injection) was statistically significant with higher successfully than the control group (conservative treatment) in reduce of length of hospital stay and number to surgery need. Additional therapy for non-operative management should be recommend without complications.

Various studies have been used other method of non-operative treatment to managed patients adhesive small bowel obstruction but controversy still remain.[17-20] Delayed operative treatment were increased mortality rate to about 30% in strangulate turn to necrosis or perforation.[21] Computed tomography may improve the accuracy of diagnosis especially completed closed loop obstruction or strangulation in small bowel obstruction.[22-24] This study used CT scan for excluded case of completed small bowel obstruction and malignant small bowel obstruction follow by exclusion criteria, not for all patients. Our study in the arm of treatment group had not seen complications from the delayed surgery (bowel resection) compared with the control group.

Previous randomized controlled trial studies for management of adhesive small bowel obstruction with oral magnesium oxide, lactobacillus acidophilus and simethicone were found that significant shorter hospital stayed than patients in the control group and number need to surgery was very low[14] because it had been effective to stimulation of bowel movement and subsequently cause the bowel empty. They did not used a prokinetic agent, which might have otherwise increase peristalsis.

Our study showing in a Randomized controlled trial that prokinetic agent and laxative drug which might have increased peristalsis to accelerated the passage of gas through the intestinal lumen and consequently reducing constipation and abdominal distension symptoms are effective and safe, no complication was seen. The use of suppository laxative to stimulated bowel movement should be quite safe and not effort on part of the patients unlike oral laxative. The laxative is almost entire locally. We used prokinetic drug to reduced gaseous symptom and promote spontaneous passage of stool and abdominal distension in intervention group. Patients given additional intravenous metoclopramide combine bisacodyl rectal suppository were more successfully spontaneous resolution than conservative treatment alone.

In systemic review study operative versus non operative management of adhesive small bowel obstruction and benefit of operative treatment is low risk of future recurrent but higher risk of mortality and complication.[25]

Laparoscopic adhesiolysis has been shown to be quickly recover in a experience hands, patients selection to laparoscopic adhesiolysis was consider and surgical judgment to be the most important factor for successful outcome.[26] In our study were 3 patients was performed laparoscopic adhesiolysis in both arm of study and post operative recovery was shorter than open exploratory adhesiolysis. Early laparoscopic adhesiolysis will be more successful and short recovery time in the intervention group than conservative group but surgeon experience is the most important consider.

Several limitations of our study were observed first, the study was prospective randomization but not double blind that cause attending bias in patients management. Second all surgical midline skin incision not excluded emergency or contamination case that potential present of severe adhesion cause some case not successfully treated. Third, this study didn't not conduct only one attending staff that cause of delayed decision making for time or type of surgical operation in case that fail conservative treatment, may cause prolong hospital stay.

Compared with conservative management, the additional of Bisacodyl suppository and prokinetic metoclopramide to be effective resolving in partial adhesive small bowel obstruction and may reduce surgical need and decrease the length of hospital stay without increase complication.

Conclusion and Recommendation

Bisacodyl suppository and prokinetic metoclopramide to be effective resolving in partial adhesive small bowel obstruction and may reduce surgical operation and decrease the length of hospital stay without complication. Further studies need to examine the early laparoscopic adhesiolysis compare to non-operative treatment with metoclopramides and Bisacodyl suppository for recurrent rate, return to work and hospital stay in prospective Randomized controlled trial.

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Ethical Considerations

Ethical considerations were taken from the ethical committee of Kratumbann Hospital (Registration No: 043/62). The protected samples were obtained as personal information and ethical concerns, which included informed-consent and maintaining confidentiality. The samples had the right to cancel participation in the study at any time without any impact.

Disclosure

The authors have no conflicts of interest.

Author Contributions

Conception and study design: SW; data collection and analysis: SW; manuscript preparation: SW & NS.

REFERENCES

1. Menzies D, Ellis H. Intestinal obstruction from adhesions—how big is the problem? Ann R Coll Surg Engl. 1990;72:60-3.
2. Rami Reddy SR, Cappell MS. A Systematic Review of the Clinical Presentation, Diagnosis, and Treatment of Small Bowel Obstruction. Curr Gastroenterol Rep. 2017;19:28.
3. Sosa J, Gardner B. Management of patients diagnosed as acute intestinal obstruction secondary to adhesions. Am Surg. 1993;59:125-8.
4. Miller G, Boman J, Shrier I, et al. Natural history of patients with adhesive small bowel obstruction. Br J Surg. 2000;879: 1240-7.
5. Klaristenfeld DD, McLemore EC, Li BH, et al. Significant reduction in the incidence of small bowel obstruction and ventral hernia after laparoscopic compared to open segmental colorectal resection. Langenbecks Arch Surg. 2015;400:505-12.
6. Assalia A, Schein M, Kopelman D, et al. Therapeutic effect of oral Gastrografin in adhesive, partial small-bowel obstruction: a prospective randomized trial. Surgery. 1994;115:433-7.
7. Chen SC, Lin FY, Lee PH, et al. Water-soluble contrast study predicts the need for early surgery in adhesive small bowel obstruction. Br J Surg. 1998;85:1692-4.
8. Chen SC, Chang KJ, Lee PH, et al. Oral urografin in postoperative small bowel obstruction. World J Surg. 1999;23:1051-4.
9. Biondo S, Parés D, Mora L, et al. Randomized clinical study of Gastrografin administration in patients with adhesive small bowel obstruction. Br J Surg. 2003;90:542-6.
10. Fevang BT, Jensen D, Fevang J, et al. Upper gastrointestinal contrast study in the management of small bowel obstruction--a prospective randomised study. Eur J Surg. 2000;166:39-43.
11. Bungard TJ, Kale-Pradhan PB. Prokinetic agents for the treatment of postoperative ileus in adults: a review of the literature. Pharmacotherapy. 1999;19:416-23.
12. Brown TA, McDonald J, Williard W. A prospective, randomized, double-blinded, placebo-controlled trial of cisapride after colorectal surgery. Am J Surg. 1999;177:399-401.
13. Ripamonti C, De Conno F, Ventafridda V, et al. Management of bowel obstruction in advanced and terminal cancer patients. Ann Oncol. 1993;4:15-21.
14. Chen SC, Yen ZS, Lee CC, et al. Nonsurgical management of partial adhesive small-bowel obstruction with oral therapy: a randomized controlled trial. CMAJ. 2005;173:1165-9.

15. Fanning J, Yu-Brekke S. Prospective trial of aggressive postoperative bowel stimulation following radical hysterectomy. Gynecol Oncol. 1999;73:412-4.
16. Wiriyakosol S, Kongdan Y, Euanorasetr C, et al. Randomized controlled trial of bisacodyl suppository versus placebo for postoperative ileus after elective colectomy for colon cancer. Asian J Surg. 2007;30:167-72.
17. Fukami Y, Kobayashi S, Sekoguchi E, et al. Randomized controlled trial of hyperbaric oxygen therapy in adhesive postoperative small bowel obstruction. Langenbecks Arch Surg. 2018;403:555-59.
18. Fukami Y, Kurumiya Y, Mizuno K, et al. Clinical effect of hyperbaric oxygen therapy in adhesive postoperative small bowel obstruction. Br J Surg. 2014;101:433-7.
19. Ji ZL, Li JS, Yuan CW, et al. Therapeutic value of sesame oil in the treatment of adhesive small bowel obstruction. Am J Surg. 2010;199:160-5.
20. Fleshner PR, Siegman MG, Slater GI, et al, Aufses AH Jr. A prospective, randomized trial of short versus long tubes in adhesive small-bowel obstruction. Am J Surg. 1995;170:366-70.
21. Ellis H. The clinical significance of adhesions: focus on intestinal obstruction. Eur J Surg Suppl. 1997:5-9.
22. Balthazar EJ. George W. Holmes Lecture. CT of small-bowel obstruction. AJR Am J Roentgenol. 1994;162:255-61.
23. Fukuya T, Hawes DR, Lu CC, et al. CT diagnosis of small-bowel obstruction: efficacy in 60 patients. AJR Am J Roentgenol. 1992;158:765-9.
24. Gazelle GS, Goldberg MA, Wittenberg J, et al. Efficacy of CT in distinguishing small-bowel obstruction from other causes of small-bowel dilatation. AJR Am J Roentgenol. 1994;162:43-7.
25. Mosley JG, Shoaib A. Operative versus conservative management of adhesional intestinal obstruction. Br J Surg. 2000;87:362-73.
26. Li MZ, Lian L, Xiao LB, et al. Laparoscopic versus open adhesiolysis in patients with adhesive small bowel obstruction: a systematic review and meta-analysis. Am J Surg. 2012;204:779-86.

บทคัดย่อ

การศึกษาเปรียบเทียบระหว่างการใช้ยาเหน็บถ่าย (Bisacodyl) ร่วมกับยาฉีดกระตุ้นการบีบตัวของลำไส้ (Metoclopramide) กับการไม่ได้รับยาในผู้ป่วยภาวะลำไส้อุดตันจากพังผืดในช่องท้อง

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[1] แผนกศัลยกรรมทั่วไป โรงพยาบาลกระทุ่มแบน

[2] คณะพยาบาลศาสตร์ มหาวิทยาลัยคริสเตียน

ความเป็นมา: ผู้ป่วยที่มีอาการแสดงของภาวะลำไส้อุดตันและมีแผลผ่าตัดทางช่องท้อง ส่วนใหญ่ได้รับการรักษาโดยการงดน้ำงดอาหาร ให้สารน้ำ และใส่สายระบายทางกระเพาะอาหาร การศึกษาก่อนหน้านี้ได้มีการใช้ยาถ่ายชนิดกินทางปาก (Magnesium oxide) ร่วมกับยาช่วยย่อย พบว่าช่วยลดอัตราการผ่าตัดและลดระยะเวลาการนอนโรงพยาบาล ในการศึกษานี้มีจุดประสงค์เพื่อเปรียบเทียบการใช้ยาเหน็บถ่าย (Bisacodyl) และยาฉีดกระตุ้นลำไส้ (Metoclopramide) ร่วมกับการรักษาแบบเดิมกับกลุ่มที่ไม่ได้รับยา

วิธีการศึกษา: เป็นการเก็บข้อมูลผู้ป่วยที่มีอาการแสดงของภาวะลำไส้อุดตันจากพังผืดในช่องท้อง จำนวน 120 คน ตั้งแต่เดือนมกราคม พ.ศ.2562 ถึงเดือนธันวาคม พ.ศ.2563 โดยเปรียบเทียบระหว่างกลุ่มที่ได้รับยาเหน็บถ่ายและยาฉีดกระตุ้นลำไส้ร่วมกับการรักษาแบบเดิมกับกลุ่มที่ไม่ได้รับยา เพื่อดูผลการตอบสนองจากการผายลมและการถ่ายอุจจาระ รวมถึงอัตราการได้รับการผ่าตัดและระยะเวลาในการนอนโรงพยาบาล

ผลการศึกษา: ในผู้ป่วยจำนวน 120 คน แบ่งเป็น 2 กลุ่มในกลุ่มทดลองและกลุ่มควบคุม กลุ่มละ 60 คน ผลการเปรียบเทียบระหว่าง 2 กลุ่ม พบว่ากลุ่มที่ได้รับยาเหน็บถ่ายร่วมกับยาฉีดกระตุ้นการบีบตัวของลำไส้สามารถผายลมและถ่ายอุจจาระได้ก่อนวันที่ 3 เทียบกับกลุ่มที่ไม่ได้รับยาอย่างมีนัยสำคัญ ($p < 0.01$) มีระยะเวลานอนโรงพยาบาลสั้นกว่า (2.55 vs 4.4, $p < 0.01$) การได้รับการผ่าตัดในกลุ่มที่ได้รับยาน้อยกว่ากลุ่มที่ไม่ได้รับยา แต่ไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติ อย่างไรก็ตามไม่พบความแตกต่างในกลุ่มอายุ เพศ และชนิดของแผลผ่าตัดในทั้ง 2 กลุ่ม

สรุปผลการศึกษา: การรักษาผู้ป่วยภาวะลำไส้อุดตันจากพังผืดในช่องท้องด้วยยาเหน็บถ่าย (Bisacodyl) และยาฉีดกระตุ้นการบีบตัวของลำไส้ (Metoclopramide) ได้ผลดีทั้งลดอัตราการผ่าตัดและลดระยะเวลาในการนอนโรงพยาบาล ปลอดภัย ไม่พบภาวะแทรกซ้อนและผลข้างเคียงจากการใช้ยา