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RISK FACTORS ASSOCIATED WITH INGUINAL HERNIA IN ADULT MALE:
A CASE-CONTROL STUDY

Mr. Anan Manomaipiboon

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

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วัตถุประสงค์: เพื่อหาความสัมพันธ์ และขนาดของความสัมพันธ์ ของปัจจัยเสี่ยงต่างๆต่อการเกิดโรคไส้เลื่อนบริเวณขาหนีบในผู้ชาย

รูปแบบการทดลอง: การวิจัยแบบสังเกตเชิงวิเคราะห์ชนิด case-control

สถานที่ทำการวิจัย: วิทยาลัยแพทยศาสตร์จุฬาลงกรณ์มหาวิทยาลัยและวชิรพยาบาล โรงพยาบาลพระมงกุฎเกล้า และโรงพยาบาลพระปิ่นเกล้า ซึ่งเป็นโรงพยาบาลระดับตติยภูมิ

วิธีการศึกษา: ได้ทำการสัมภาษณ์ และตรวจร่างกายผู้ป่วยชายที่อายุมากกว่า 15 ปี จำนวน 219 คน แบ่งออกเป็น 2 กลุ่ม กลุ่มแรกเป็นผู้ป่วยโรคไส้เลื่อนบริเวณขาหนีบที่มีอาการของโรคมาไม่เกิน 12 เดือน และเข้ารับการผ่าตัดรักษาเป็นผู้ป่วยในจำนวน 73 คน ส่วนกลุ่มที่สองเป็นกลุ่มควบคุม ได้แก่ผู้ป่วยในของโรงพยาบาลนั้น ๆ ที่ได้รับการซักประวัติพร้อมทั้งการตรวจร่างกายโดยศัลยแพทย์ทั่วไปแล้วว่าไม่มีอาการและอาการแสดงของโรคไส้เลื่อนบริเวณขาหนีบ อีกทั้งไม่เคยมีประวัติการผ่าตัดรักษาโรคดังกล่าวมาก่อน โดยที่กลุ่มควบคุมมีอายุแตกต่างจากกลุ่มแรกอยู่ในช่วงระยะเวลาไม่เกิน 5 ปี และโรคสำคัญที่ต้องเข้ารับการรักษาในโรงพยาบาลไม่ใช่โรคระบบทางเดินปัสสาวะ โรคลำไส้ใหญ่ทวารหนัก โรคปอด และโรคหัวใจ ผู้ป่วยทั้งสองกลุ่มจะได้รับการสัมภาษณ์เกี่ยวกับประวัติส่วนตัว ประวัติการยกของหนัก การสูบบุหรี่ อาการของโรคทางเดินปัสสาวะส่วนล่างอุดตัน โรคท้องผูก อาการไอเรื้อรัง ประวัติการผ่าตัดบริเวณช่องท้องส่วนล่าง และได้รับการชั่งน้ำหนัก วัดส่วนสูง พร้อมทั้งตรวจดูบริเวณหน้าท้องในกรณีที่เคยได้รับการผ่าตัดบริเวณหน้าท้องส่วนล่างมาก่อน

ผลการศึกษา: ผู้ชายที่มีประวัติยกสิ่งของที่มีน้ำหนักมากมีโอกาสเสี่ยงต่อการเกิดโรคไส้เลื่อนบริเวณขาหนีบที่ไม่แตกต่างจากผู้ที่ไม่เคยมีประวัติการยกสิ่งของที่มีน้ำหนักมาก ทั้งในแง่ของขนาดน้ำหนักของสิ่งของ และระยะเวลาที่ยกสิ่งของที่มีน้ำหนักมาก โดยมีค่าความเสี่ยงเท่ากับ 1.13 เท่า (95% CI เท่ากับ 0.58 – 2.22) สำหรับปัจจัยอื่น ๆ ได้แก่การสูบบุหรี่ ภาวะที่ทำให้มีแรงดันในช่องท้องเพิ่มสูงขึ้น ประวัติการผ่าตัดไส้ติ่งผ่านทางผนังหน้าท้องส่วนล่างด้านขวา และภาวะน้ำหนักที่มากกว่าปกติไม่ได้ทำให้มีโอกาสเสี่ยงมากขึ้นหรือน้อยลงกว่าผู้ที่ไม่ปัจจัยดังกล่าวเช่นกัน โดยมีค่าความเสี่ยงในผู้ที่มีปัจจัยดังกล่าวเท่ากับ 1.03 (95% CI เท่ากับ 0.55 – 1.9) 1.05 (95% CI เท่ากับ 0.59 – 1.9) 1.29 (95% CI เท่ากับ 0.44 – 1.32) และ 0.66 (95% CI เท่ากับ 0.33 – 1.32) ตามลำดับ

สรุป: นอกจากอายุ และเพศชายที่ทราบกันดีว่ามีความสัมพันธ์กับโรคไส้เลื่อนบริเวณขาหนีบในผู้ชายแล้ว ยังมีรายงานจำนวนมากที่กล่าวอ้างว่าประวัติการยกสิ่งของที่มีน้ำหนักมาก รวมไปถึงการสูบบุหรี่ ภาวะที่ทำให้มีแรงดันในช่องท้องเพิ่มสูงขึ้น ได้แก่ การอุดตันของทางเดินปัสสาวะส่วนล่าง อาการท้องผูก อาการไอเรื้อรัง และประวัติการผ่าตัดไส้ติ่งผ่านทางผนังหน้าท้องส่วนล่างด้านขวา ล้วนแต่เป็นปัจจัยเสี่ยงต่อการเกิดโรคไส้เลื่อนบริเวณขาหนีบในผู้ชาย แต่จากผลการศึกษาครั้งนี้พบว่าไม่มีหลักฐานที่มากเพียงพอที่จะสรุปได้ว่าปัจจัยต่าง ๆ ดังกล่าวข้างต้น เป็นปัจจัยเสี่ยงต่อการเกิดโรคไส้เลื่อนบริเวณขาหนีบในผู้ชาย

หลักสูตร การพัฒนาสุขภาพ

ลายมือชื่อนิสิต.....

สาขาวิชา การพัฒนาสุขภาพ

ลายมือชื่ออาจารย์ที่ปรึกษา.....

ปีการศึกษา 2545

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

##4475432330: MAJOR HEALTH DEVELOPMENT

KEYWORDS: RISK FACTORS, INGUINAL HERNIA, MALE, CASE-CONTROL STUDY

ANAN MANOMAIBOON: RISK FACTORS ASSOCIATED WITH INGUINAL HERNIA IN ADULT MALE: A CASE-CONTROL STUDY. THESIS ADVISOR:, ASST. PROF. WINAI WADWONGTHAM M.D., M.Sc. THESIS CO-ADVISOR: Lt. Col. PIYA TEAWPRASERT, M.D., M.Sc., 74 pages. ISBN 974-17-1599-4

Objective: 1. To determine the association between heavy object lifting and occurrence of inguinal hernia in adult male 2. To identify the other risk factors of inguinal hernia in adult male

Design: An unmatched case-control study.

Setting: Three tertiary care hospitals – Bangkok Metropolitan Administration Medical College and Vajira Hospital, Phramongkutklao Army General Hospital and Phrapinklao Hospital.

Method: Two hundred and nineteen patients were enrolled in this study, 73 patients as cases and 146 patients as controls. Cases were defined as newly diagnosed inguinal hernia in adult male with the duration of symptom less than one year. The corrected diagnoses were confirmed from operative report. Previously surgical repairs of inguinal hernia were excluded. Controls were male in-patients who were admitted during the same periods as cases. Controls were approximately age-matched within five years interval to cases. In-patients with urological, colo-rectal and cardio-thoracic diseases were not recruited as controls. Both cases and controls were asked to answer the same questions on their demographic background, past history of heavy object lifting, smoking, urinary outflow tract obstruction, constipation, chronic cough. Their height, estimated body weight before occurrence of the diseases and previous appendectomy via right lower abdominal incision were recorded.

Result: In univariate and multivariate analysis, no association between all exposure variables and inguinal hernia were found. The adjusted odds ratio for inguinal hernia in relation to past history of heavy object lifting was 1.13 (95% CI = 0.58 – 2.22). The adjusted odds ratio in relation to smoking, increased intra-abdominal pressure, previous appendectomy and obesity were 1.03 (95% CI = 0.55 – 1.9), 1.05 (95% CI = 0.59 – 1.9), 1.29 (95% CI = 0.44 – 1.32) and 0.66(95% CI = 0.33 – 1.32) respectively.

Conclusion: Risk effects of heavy object lifting, smoking, urinary outflow tract obstruction, constipation, chronic cough to inguinal hernia are always posted without adequately evidence supports. This study did not suggest an inverse effect between past history of heavy object lifting, smoking, increased intra-abdominal pressure, previous appendectomy and inguinal hernia.

Department Health Development
Field of study Health Development
Academic year 2002

Student's signature.....
Advisor's signature.....
Co-advisor's signature.....

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CONTENTS

ABSTRACT (Thai).....	iv
ABSTRACT (English).....	v
ACKNOWLEDGEMENT.....	vi
CONTENTS.....	vii
LIST OF TABLES.....	ix
CHAPTER 1	
Rationale and background.....	1
CHAPTER 2	
Review of related literature.....	5
CHAPTER 3	
Research methodology.....	8
3.1 Research questions	8
3.2 Research objectives.....	8
3.3 Hypothesis.....	8
3.4 Conceptual framework.....	9
3.5 Research design.....	10
3.6 Population and sample.....	10
— Target population.....	10
— Sample population.....	10
— Definition of case.....	11
— Definition of control.....	11
— Inclusion criteria.....	12
— Exclusion criteria.....	12
3.7 Sample size.....	14
3.8 Measured variable.....	14
— Demographic and baseline variables.....	14
— Exposure variables.....	14

CONTENTS (continued)

3.9 Instrument development and testing.....	16
3.10 Possible sources of bias and prevention.....	31
3.11 Measurement deals with measures of disease occurrence.....	31
3.12 Data collection.....	32
3.13 Data analysis.....	33
3.14 Ethical consideration.....	35
CHAPTER 4	
Results.....	36
4.1 Demographic and baseline variables.....	36
4.2 Univariate analysis.....	39
4.3 Stratified analysis.....	43
4.4 Multivariate analysis.....	43
CHAPTER 5	
Discussion.....	47
Limitation.....	49
Conclusion	49
References.....	50
Appendices.....	53
Appendix 1 ASA physical status classification.....	54
Appendix 2 Guideline for heavy object lifting assessment.....	55
Appendix 3 Consent form.....	57
Appendix 4 Questionnaire (English version).....	59
Appendix 5 Questionnaire (Thai version)	66
Vitae.....	74

LIST OF TABLES AND FIGURES

Table		Pages
1	Summaries of risk factors associated with inguinal hernia.....	7
2	Classification of obesity	15
3	Item correlation of Modified Baecke Questionnaire on physical activity....	18
4	The item-total statistics of the symptom index for urinary outflow tract obstruction.....	22
5	Observe frequencies on diagnosis of urinary outflow tract obstruction by two urologists.....	23
6	The interpretations of agreement.....	24
7	Sensitivity and specificity of symptom index for urinary outflow tract obstruction.....	24
8	Results of content validity testing of symptom index for constipation.....	26
9	The item-total statistics of the symptom index for constipation.....	28
10	Observe frequencies on diagnosis of constipation by two experts.....	29
11	Sensitivity and specificity of the symptom index for constipation.....	29
12	Result of answers about first degree family history of inguinal hernia.....	31
13	Relationship of disease risk in exposed group/disease risk in non- exposed group.....	32
14	Descriptive statistics for demographic and baseline variables.....	33
15	Association testing between exposure variables and the dependent variables.....	34
16	The distribution of diagnoses among cases and controls.....	36
17	The demographic characteristics of cases and controls.....	37
18	Distribution of marital status, education and occupation among cases and controls.....	38
19	Association and magnitude of association between each exposure variables and inguinal hernia.....	40

LIST OF TABLES AND FIGURES (continued)

20	The result of logistic regression from STATA version 7	44
21	Crude odds ratios and odds ratios adjusted for the effect of other exposure variables	45
FIGURE		PAGE
1	A receiver operating characteristic curve of symptom index for urinary outflow tract obstruction.....	25
2	A receiver operating characteristic curve of symptom index for constipation.....	30



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

CHAPTER 1

INTRODUCTION

Rationale and Background

The inguinal area is one of the natural weak areas in the abdominal wall and is the most common site for abdominal wall hernia. Both sexes of all ages are afflicted, but men are 25 times more likely to have inguinal hernia than female. Aging also increased the incidence. (1,2) Although the repair of inguinal hernias has been constituted the common class of major operations performed by a general surgeon through out the world, little attention was devoted in the past to the epidemiological study, economic and sociologic aspects of such surgery. Both incidence and prevalence of inguinal hernias remain essentially unknown. (1,2) Therefore, yet basic, questions as the chance that an individual will, over the course of their lifetime, be in need of or actually undergo a inguinal herniorrhaphy that exist in a given society on any particular day continue to be statistically undefined.

This lack of fully understanding the epidemiological aspects of inguinal hernia occurs despite the presence of numerous studies and various writings on the subject. In the early nineteenth century, there was the first study of prevalence of inguinal hernia in military troops in France. After mathematical reasoning, the overall prevalence rate was approximately 3.2%. In 1941 Alfred Iason provided one of the most extensive reviews on this subjects. Using various statistical information, he estimated there were about 6 millions hernia patients in the United States, or a prevalence of 4.6%. In 1979, the report from the National Center for Health Statistics (NCHS) in United States by using a health interview methodology, it was reported that prevalence rates was 1.9% for men of all ages, for men aged 17-44 years, the rate was 1% and for those 45-64 years, the rate was 3.8%. In 1996, to facilitate a fuller understanding of the health care provision system in the United stated, the NCHS conducted a National Survey of Ambulatory Surgery, it was reported that a total of approximately inguinal herniorrhaphies was 756,000 in 1996. Ninety percent of all inguinal hernia operations were performed on men and more than 80% occupied in adult patients. (1,3)

Concerning about the causes of primary inguinal hernia, there are multifactorial processes. Firstly, in evolution period, there is a potential abdominal wall defect in lower abdomen that serves as the passage of blood vessels, nerves, lymphatics and vas deferens. (4) This unfortunately evolutionary defect in humans is compounded by humans having adopted the upright posture and changed from quadrupedal to bipedal locomotion leading to alteration in functional anatomy of inguinal region which leading to the development of inguinal hernias. Yet almost all other mammals that walk on all four limbs have a lower abdominal wall structure similar to that of humans and even have a permanently patent processus vaginalis, they are rarely suffer from inguinal hernias. All inguinal hernias represent a defect of the transversalis fascia. The myopectineal orifice is the weak area bounded by the internal oblique muscle, the transverse abdominal muscle, iliopsoas muscle, rectus muscle and sheath, and the pecten of the pubis. The integrity of their abdominal wall is dependent on the oblique orientation of the inguinal canal, a sphincter-like structure of the internal ring and the transversalis fascia.

The second factor that probably associated with inguinal hernia is a patent processus vaginalis. A patent processus vaginalis is the prime cause of indirect inguinal hernia in infants and children in whom it is cured by simple ligation at the internal ring (herniotomy operation). Contrast to the adult with patent processus vaginalis, only herniotomy in adults is followed by a high rate of recurrent indirect inguinal hernia, indicating that additional etiologic factors are involved. The presence of a patent processus vaginalis does not necessarily indicate that an indirect inguinal hernia is present because a patent processus vaginalis could be found in 20% of adult autopsy examinations. None of them suffered from hernia during life. (5,6)

The third factor is increased intra-abdominal pressure. In 1804, Cooper stated that the cause of hernia was mechanical disparity between visceral pressure and the resistance of the abdominal musculature. He listed cough, prostatism, constipation, pregnancy, obesity and unusual exertion, especially heavy lifting as causes of increased intra-abdominal pressure and therefore causes of hernia. (6) However, recent works suggests that these conditions do not cause inguinal hernias on their own but may be additional facilitating factors acting on the basic etiology to bring on a hernia. (7)

The fourth factor is the integrity of the transversalis fascia. The ability of the transversalis fascia to withstand physiologic and pathologic elevations in the intra-abdominal pressure is depend on the state of the collagen fibers that make up its tissues and give it strengthen. Collagen is an active, live tissue maintained by a balanced state of production and absorption. The transversalis fascia may be attenuated by factors that interfere with normal production of collagen or cause its increased destruction or the production of abnormal collagen fibers. These factors include certain congenital connective tissue disorders such as Marfan's, Ehlers-Danlos syndromes causing a deficiency of collagen and structural abnormalities of the collagen fibers, predisposing to inguinal hernias. Hereditary also plays a part in the development of inguinal hernias, as evidenced by the high incidence of hernias in several generations of a family above that of the general population. (6,7,8)

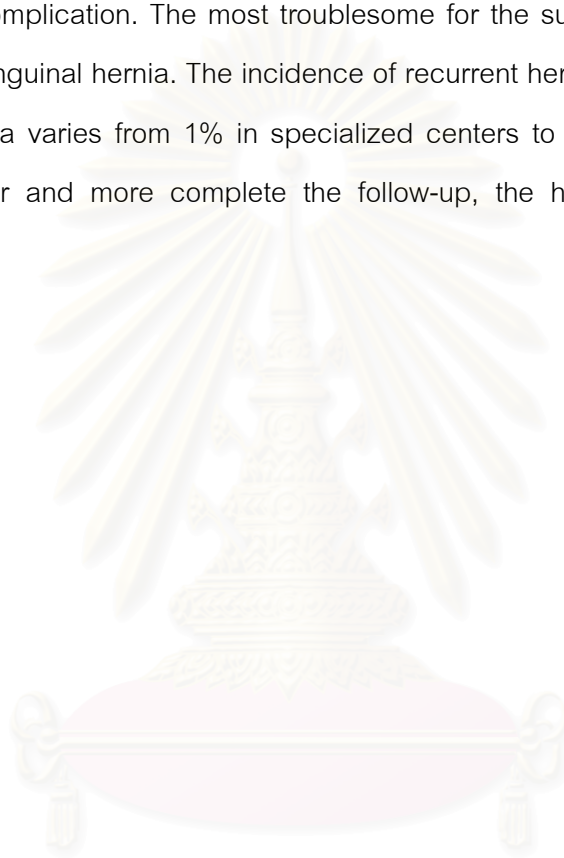
There were others investigation about the normal and abnormal metabolism of collagen and its relationship to the causation of hernia, especially in smokers. They found that substances in cigarette smoke inactivate antiprotease in lung tissue and so upset the protease/antiprotease system, which is responsible for the integrity of the lung tissue leading to its destruction and emphysematous change. This mechanism brings to destruction of elastin and collagen of the rectus sheath and transversalis fascia and so cause their attenuation and predispose to herniation in cigarette smokers. (10,11)

The last factors are general factors. The ability of the abdominal wall in the inguinal region to withstand the forces in favor of herniation may be reduced by the weakening of the muscles and fascia with advancing age, lack of physical exercise, obesity, loss of weight and body fitness as may occur after illness. (2,8,9,12,13,14) The operation or prolonged bed rest and cosmetic operative incisions which are very low and long transverse abdominal incisions may be followed by the appearance of an inguinal hernia caused by cutting into the myoaponeurotic arch or cutting across the motor nerves of the inguinal region, causing atrophy of the muscles. (15)

Concerning about diagnosis, only history and physical examination by qualified surgeons can establish the diagnosis of inguinal hernia. (2,12,13) The definite diagnosis can be established at the time of operation. There are many kinds of classification for inguinal hernia but the simple and easy technique that is always used depends on

localization of the hernial orifice. It composed of direct inguinal hernia (medial), indirect inguinal hernia (lateral) and femoral hernia. (7,12,13)

Generally, the diagnosis of inguinal hernia implies surgical repair. The only exceptions are terminally ill patients with uncomplicated inguinal hernia. Surgical repair either conventional or laparoscopic technique must be scheduled at the time of diagnosis because of no spontaneous resolution, progressively increased in size and probable risk for complication. The most troublesome for the surgeons who repair the hernia is recurrent inguinal hernia. The incidence of recurrent hernia after primary repair of an inguinal hernia varies from 1% in specialized centers to nearly 30% in general surveys. The longer and more complete the follow-up, the higher recurrence rate. (2,12,13)



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CHAPTER 2

LITERATURE REVIEWS

Literature search strategy

The literature search strategy used to locate the information in this review is the Pub-MED reference database and additionally by going through the reference list of other articles and institutional database. The keywords used were inguinal hernia and risk factors.

Review of related literature

Inguinal hernias can either be congenital or acquired. The estimated incidence of inguinal hernia in men is about 3 percent, thus making inguinal hernia a major economic problem. After electronic searching about inguinal hernia, most of these documents were pointed in therapeutic measures. Various surgical techniques for primary and recurrence inguinal hernia were described and compared. Less than 10 documents were etiological study. In these etiological study, there were only two documents that had well-designed and reliable methodology. The residual documents were retrospective descriptive study and retrospective exploratory analysis.

Undoubtedly, sex especially male and older ages are strongly associated with inguinal hernia but the associations with the other factors are not clear. In predominantly male populations, the risk factors that have been found to be associated with inguinal hernia are muscle deficiency (previous appendectomy or other lower abdominal operations), physical stress, increased intra-abdominal pressure (constipation, prostatism, chronic cough), smoking, aging, genetically, pelvic fracture and systemic illness. (3,5,6,7,8,9,14) In female populations, obesity, pregnancy and operative procedures have been shown to be risk factors that commonly contribute to the formation of inguinal hernia. (9) However, all of these risk factors had been quantified very little. Most of the reports were retrospective descriptive and

retrospective exploratory. The detailed of the two well designed were summarized as below:

Carbonell, et al (8) performed a case-control study to evaluate the risk factors of inguinal hernia. The objectives of this study assessed the reported risk factors for the development of inguinal hernia especially physical effort. Sex and age matching were applied in this study. The study was retrospective and interviewing collected the data. The main instrument was an effort-score questionnaire for measuring physical effort from working and playing. The measurements for others risk factors such as chronic cough, frequency of defecation, consistency of feces, etc. were two-response questions (yes or no) that had less validity for these factors. Body weight and height were recorded from answering the questions. Retrospective case selection and recruitment of all cases who underwent inguinal herniorrhaphy within three years before data collection were the disadvantage in this study. From this study, they conclude that heavy objects lifting over long periods of time was the only one significant risk factor (OR = 2.92, 95%CI 2.11 – 4.04). This conclusion could produce a lot of confusion because the effort score involved both working and playing activity.

Liem, et al (9) performed a case-control study to evaluate the risk factors of inguinal hernia in female. The objectives of this study assessed the reported risk factors for the development of inguinal hernia especially physical activity. Sex and age matching were applied in this study. The study was prospective and mailed questionnaire was used for collecting the data. The main instrument was a lifetime physical activity questionnaire. This questionnaire estimated recent and present activity in three categories: work, sports activity and leisure time. The measurements for others risk factors such as obstipation, COPD, urinary tract obstruction, trauma, abdominal operations, pelvic fracture, smoking and family history were two-response questions (yes or no) that contained in mailed questionnaire. These two-response questions had less validity in some exposure variable. The significant risk factors in this study were positive family history (OR = 4.3, 95%CI 1.9 – 9.7) and obstipation (OR = 2.5, 95%CI 1.0 – 6.7). The significantly protective factor was BMI more than 30 kg/m² (0.2, 95%CI 0.04 – 1.0).

Table 1: Summaries of risk factors associated with inguinal hernia

Authors	Textbook and journal	Factors
Carbonell JF, sanchez JL, et al. (8)	Eur J Surg, 1993 (case-control: retrospective data collection, include both male and female)	Physical effort : lifting heavy objects for a long period (Crude OR2.92)
Liem MS, van der Graaf Y, et al. (9)	Am J epidemiol, 1997 (case-control : risk factors in female)	Risk factors in female : Positive family history (OR 4.3), Constipation (OR2.5), Obesity (OR0.2)
Schumpelick V, Treutner KH, et al. (7)	Surg 1994 (Retrospective exploratory)	Risk factors: obesity, COPD, BPH, ascites, pregnancy and constipation
Gue S. (15)	Br J Surg 1972 (Retrospective description)	Previous appendectomy
Wantz GE. (2)	Abdominal wall hernias, In: Schwartz SI, Shires GT, Spencer FC, eds. Principle of Surgery 7 th ed. 1999	Positive family history, increased intra-abdominal pressure, smoking, aging, connective tissue disorder
Richard C. (12)	Inguinal hernia, In: Morris PJ, Malt RA, eds. Oxford Textbook of Surgery, 1994	Persistent cough, difficulty in micturition, constipation
Eubanks S. (13)	Hernia, In Sabiston DC Jr, Lyerly HK, eds. Textbook of Surgery 15 th ed, 1997	Straining to urinate, defecate, coughing and heavy lifting, smoking, aging, strenous physical activity and athletics

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 Research questions

3.1.1 Is an increased risk of inguinal hernia in adult male associated with heavy object lifting?

3.1.2 Is an increased risk of inguinal hernia in adult male associated with increased intra-abdominal pressure (urinary outflow tract obstruction, constipation, chronic cough), obesity, smoking, positive family history and previous appendectomy through the right lower abdominal incision?

3.2 Research objectives

3.2.1 To determine the association between heavy object lifting and occurrence of inguinal hernia in adult male

3.2.2 To identify the other risk factors of inguinal hernia in adult male

3.3 Hypothesis

Null hypothesis

3.3.1 Heavy objects lifting for a long period of time is not associated with occurrence of inguinal hernia in adult male.

3.3.2 Obesity is not associated with occurrence of inguinal hernia in adult male.

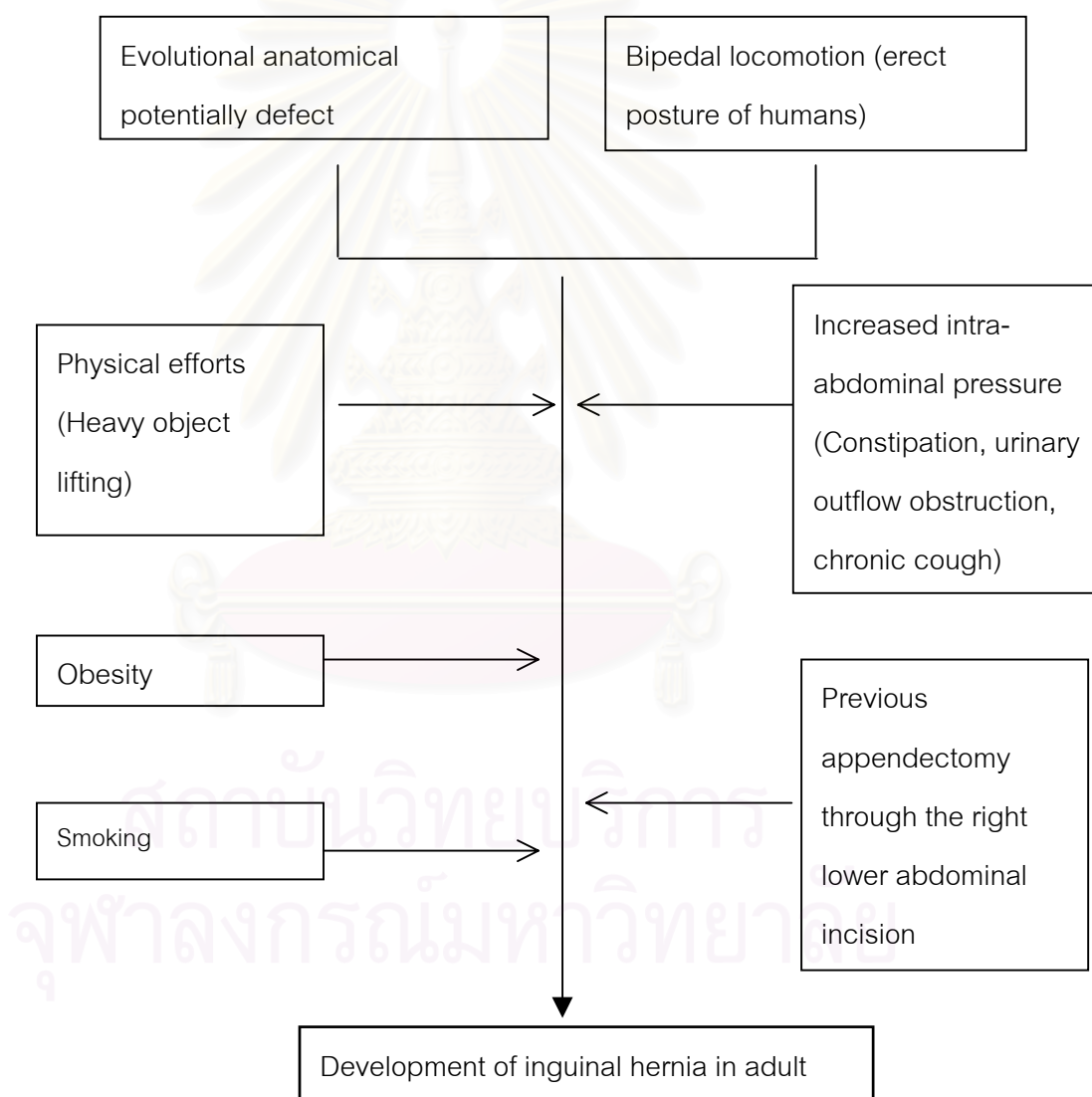
3.3.3 Smoking is not associated with occurrence of inguinal hernia in adult male.

3.3.4 Increased intra-abdominal pressure especially with chronic constipation, urinary outflow tract obstruction and chronic cough are not associated with occurrence of inguinal hernia in adult male.

3.3.5 Previous appendectomy through the right lower abdominal incision and positive family history are not associated with occurrence of inguinal hernia in adult male.

3.4 Conceptual framework

Because of high incidence of inguinal hernia make inguinal hernia repair the second most frequent procedure in general surgery, accounting for 10-15% of all operations, with an expected 750,000 such repairs to be completed in United States in 1996. (1) Furthermore, about 5-10% of previous inguinal hernia repair will be underwent the second or third repair for recurrence hernia in the future. These data demonstrate the huge impact of herniorrhaphy of health-care expenditure and working disability. However, etiology remains unknown, it is presumed that inguinal hernia is due to one or more of the above factors together with an individual predisposition.



3.5 Research design

Although an experimental design of a randomized controlled trial is acknowledged to be the strongest study strategy for explaining a cause and effect relationship, this method for this research is definitely not possible for ethical reasons. Assigning patients randomly for exposure to factors under study certainly violates human rights and is unsuitable in humans. Another ideal design for risk factors study, prospective cohort study will take more time and resources that is difficult to justify. Then a case-control study is appropriate for this research. The advantage of the design for this research is the fact that the investigators do not have to continue observation the subject for a long time period. (16)

In summary, the advantages of the case-control design are

1. Easy to conduct
2. Less expensive
3. Allows study of multiple potential causes of a disease with no risks to subjects included in the study.
4. If the outcome is not rare, the study can be conducted in a short period of time.

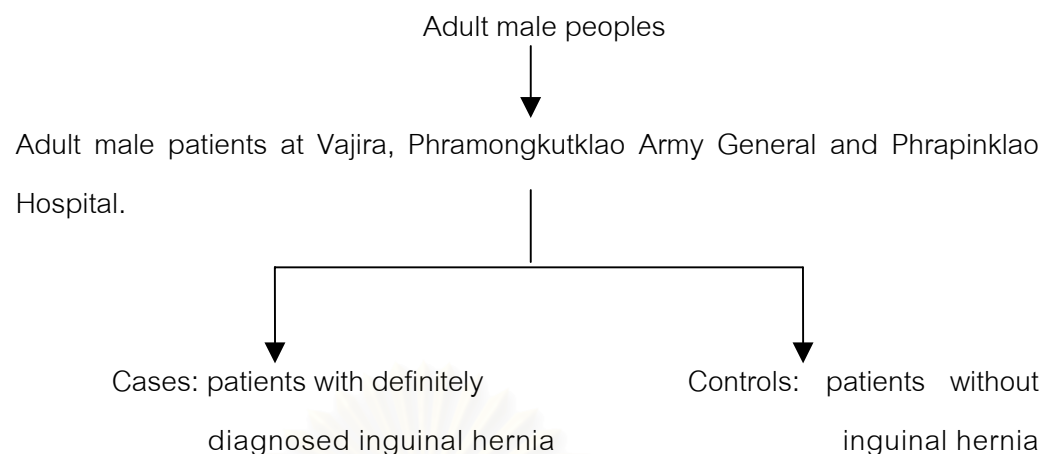
According to the advantage of this design, bias can occur in many steps.

3.6 Population and sample

The cases and controls involved in this study were selected from the in-patients of Vajira Hospital, Phramongkutklao Army General Hospital and Phrapinklao Hospital.

3.6.1 Target population: Adult male people with more than 15 years old

3.6.2 Sample population: Adult male patients seen at Vajira Hospital, Phramongkutklao Army General Hospital and Phrapinklao Hospital.



3.6.3 Definition of case

Cases were new patients diagnosed inguinal hernia that were defined as a clinically detectable swelling in the inguinal region or a clearly palpable defect of the abdominal wall in the inguinal region with the onset of symptoms were less than one year. For all new cases, operative reports were obtained to confirm diagnosis for excluding uncertainty. Then, there was no ambiguous problem in defining the cases. The patients who experienced the symptom for more than one year or underwent inguinal hernia surgery were excluded from the study. Patients, who were mentally incompetent, unable to speak or understand Thai language and ASA physical status more than 2 were excluded too.

3.6.4 Definition of control

Controls were selected from the inpatient of surgical and ophthalmological wards in the same month as cases. Patients with urological and colo-rectal diseases were not included. All controls were historical reviewed and examined by qualified general surgeons to exclude the occult inguinal hernia and matching with age within 5-year interval to the case. The ratio was 1 case to 2 controls. The patients who had atypical symptoms in inguinal region without definite diagnosis of inguinal hernia were excluded. Patients, who were mentally incompetent, unable to speak or understand Thai language and ASA physical status more than 2 were excluded too.

3.6.5 Inclusion criteria

- Male patients who manifested with inguinal hernia for less than 1 year
- Control subjects were historical reviewed and examined by qualified general surgeons to exclude the occult inguinal hernia.
- Agree to participate

3.6.6 Exclusion criteria

- Patients who had a history of previous inguinal hernia surgery
- Controls who were admitted to the hospital with colon, rectum and urological diseases
- Cases and controls who were not able to communicate with the interviewers due to physical, mental disabilities and ASA physical status more than 2

Staffs that did not participate in the interviewing process recruited all cases and controls.

3.7 Sample size

The number of subjects included in the investigation of disease-exposure relationship was a fundamental consideration in planning this research. The sample had to be large enough to avoid two sources of error. The first one claiming that exposure was associated with the disease when in truth it was not and the second one claiming that exposure was not associated with the disease when in fact it was. When the frequency of exposure between cases and controls were compared by the statistical test, the probability of making the first error was called the level of significance, denoted by α . The probability of making the second error was represented by β . The power of the study was $1-\beta$.

α was set at 0.05 in two-tailed, β was 0.2 with power of 80%. The relative frequency of exposure among controls in the target population was P_0 and a hypothesized odd ratio associated with exposure of sufficient biologic or public health importance to warrant its detection was R . There fore, sample size was obtained by using the formula for an unmatched, unequal case-control ratio (16)

$$n = \left[z_{\alpha} \sqrt{(1+1/c) \bar{p}\bar{q}} + z_{\beta} \sqrt{p_1 q_1 + p_0 q_0 / c} \right]^2 / (p_1 - p_0)^2$$

n = number of cases

c = number of controls, $c = 2$ indicating a 1 : 2 case : control ratio

$$\text{where } P_1 = \frac{P_0(OR)}{1 + P_0(OR - 1)}$$

$$\bar{p} = \frac{(p_1 + cp_0)}{(1 + c)}, P_0 = \text{the proportion exposed in control}$$

$q = 1 - p$, OR = odds ratio

From literature review, there was only one study about risk factors of inguinal hernias in male. The only one risk factor was physical effort (lifting heavy objects for a long time) with the odds ratio 2.92. Concerning about the proportion exposed in control, more than 70% of the populations in Thailand were agriculture. But this study was performed in Bangkok, which is the capital city. Then proportion of males who exposed to this factor was certainly less than 70%. The exactly proportion was unknown, and then the proportion of 0.3 was selected for the sample size calculation. By substitute these values to the formula, the calculation was

$$n = \frac{\left[1.96 \sqrt{1.5 \times .386 \times .614} + 0.84 \sqrt{(.5558 \times .4442) + (.3 \times .7) / 2} \right]^2}{(.5558 - .3)^2}$$

$$n = 42.47$$

By calculation, the number of case was 42.47. Then, 47 cases and 94 controls were selected for estimating missing data at 10%. If increasing the number of controls per case, the numbers of cases were decreased. Increasing or decreasing the odd ratio had been affected the sample size too.

Because of using multiple logistic regression to correct for the simultaneous effects of multiple variables in this study, the sample size determination that was selected might be inadequate. (17,18) If at least 4 variables were selected for fitting the model, the estimated sample size for multiple logistic regression in this study should be 160 subjects. (19) The minimum number of cases and control should be 54 and 108.

3.8 Measured variables

This study attempts to identify the risk factors of inguinal hernia in male from a list of variables. The primary aim was to detect any association between these factors and the outcome. The data was extracted from patients' record and interviewing by trained personals that did not know the objectives of the study. The measured variables were as followed:

3.8.1 Demographic and baseline variables

3.8.1.1 Age (years)

3.8.1.2 Marital status was classified into 3 groups single, married and divorced/separated/widowhood

3.8.1.3 Education was classified into 5 groups such as never / illiterate, elementary (Prathomsuksa level), high school (Matayomsuksa level 1-6), vocational school / college and university level or higher

3.8.1.4 Occupation was classified into 4 groups include student/unemployed, unskilled labour, agriculture, skilled labour and professional.

3.8.1.5 Diagnosis (diseases)

3.8.1.6 Duration of the diseases

3.8.1.7 Body weight (kilograms)

3.8.1.8 Height (centimeters)

3.8.1.9 BMI (kg/m^2)

3.8.2 Exposure variables

3.8.2.1 Past history of heavy object lifting before appearance of the diseases was evaluated by using the definition and guideline from three documents. The first was International Labour Organization (20) that was one of the references for the future revision of the Thailand Labour Protection Act (B.E.2541) that come into force form August 19th, 1988. The second was the definition trailer from Department of Labor, United States of America. (21) (Appendix 2.1 – 2.2) The third was Modified Baecke Questionnaire on physical activity. (22,23) The duration of exposure and weight of objects were recorded and set as broad as possible to minimize the chance of misclassification. Physical activity was not

included in this study because many peoples believe that heavy object lifting is the main cause of inguinal hernia. Then, this study was pointed to the history of heavy object lifting as the main exposure variable.

3.8.2.2 Obesity, this variable was classified by using the definition of WHO as shown in table 2. (24,25) The body weight of the subjects before appearance of the diseases was estimated from the bodyweight at the time of interviewing. Their relatives were requested for checking the estimation. The height was recorded for body mass index (kg/m^2) calculation

Table 2: Classification of obesity

	Obesity classification	BMI(kg / m^2)
Under weight	–	<18.5
Normal	–	18.5-24.9
Overweight	–	25.0-29.9
Obese	I	30.0-34.9
	II	35.0-39.9
	III	>39.9

3.8.2.3 Smoking was measured by using the questionnaire designed by WHO committee on study of smoking (26). The amount and duration of exposure (in year) were recorded and set as broad as possible to minimize the chance of misclassification.

3.8.2.4 Past history of urinary outflow tract obstruction before appearance of the diseases was measured by using medical history and the American Urological Association symptom index for benign prostatic hyperplasia 1992. (27,28,29)

3.8.2.5 Past history of constipation before appearance of the diseases was measured by using a newly developed symptom index for constipation that included various symptoms related to constipation. This symptom index was constructed by using the guidelines from previous studies. The result from

previous studies showed that the normal bowel frequency was defined as bowel movements between 3 times per week and three times per day. (30,31)

3.8.2.6 Past history of chronic cough before appearance of the diseases was evaluated by using the definition of chronic bronchitis in chronic obstructive pulmonary disease, which is a condition, associated with excessive tracheo-bronchial mucus production to cause cough for at least 3 months of the year, more than 2 years consecutively. (32)

3.8.2.7 Past history of appendectomy through the right lower abdominal incision was evaluated by interviewing and abdominal wall examination. The type of incision and the kinds of operation were recorded. In cases, this variable was classified if the inguinal hernia was on the same right side.

3.8.2.8 First-degree family history of inguinal hernia was checked by asking the subjects and their relatives about this disease in first degree beyond the subjects.

3.9 Instrument development and testing for reliability and validity

There were many exposure variables involved in this study. Then a small-scale feasibility questionnaire for each variable was conducted for measuring the variables by selecting or developing the accurate instrument. The standard questionnaires for each exposure variables that were already existed were selected and modified to maximize the reliability and validity of this study.

3.9.1 Measurement for past history of heavy object lifting before appearance of the disease.

Firstly, the Modified Baecke Questionnaire on physical activity (22,23) that was developed in 1995 was tested. This questionnaire was the main instrument in the previous study of risk factors for inguinal hernia. (9) Assessing physical activity was the main purpose of this questionnaire. It consisted of 19 items of three components included work index, sports index and leisure index. To verify content validity of the proposed measuring tool, this questionnaire was sent to 3 experts to evaluate the content and give the score for each item. All experts were asked to evaluate the relevance and the adequacy of this questionnaire to measure the history of heavy object lifting. The scoring system was as followed:

+1 for relatively valid item

0 for not sure

-1 for relatively irrelevant item

The obtained scores from each item were calculated to demonstrate the validity of each item by using the formula below: (33)

$$IC = \sum R / N$$

Where IC = item correlation

R = total score of that item

N = number of experts

The results of content validity testing are demonstrated in table 3.



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Table 3: Item correlation of Modified Baecke Questionnaire on physical activity

Item No.	Expert			Total	IC
	I	II	III		
1. What is your main occupation?	+1	0	+1	2	0.6
2. At work I sit....	0	-1	-1	-2	-0.6
3. At work I stand...	-1	-1	-1	-3	-1
4. At work I walk....	-1	-1	-1	-3	-1
5. At work I lift heavy loads...	+1	+1	+1	3	1
6. At work I am tired...	-1	-1	-1	-3	-1
7. At work I sweat...	-1	-1	-1	-3	-1
8. In comparison with others of my own age I think my work is physically... (Much lighter, Lighter, As heavy, Heavier, Much heavier)	-1	-1	-1	-3	-1
9. Do you play sport? Yes/No 9.1 Which sport do you play most frequently? 9.2 How many hours a week? 9.3 How many months a year? 9.4 If you play a second sport: 9.5 Which sport is it? 9.6 How many hours a week? 9.7 How many months a year?	-1	-1	-1	-3	-1
10. In comparisons with others of my own age I think my physical activity during leisure time is....	-1	-1	-1	-3	-1
11. During leisure time I sweat...	-1	-1	-1	-3	-1
12. During leisure time I play sport...	-1	-1	-1	-3	-1
13. During leisure time I watch television...	-1	-1	-1	-3	-1
14. During leisure time I walk...	-1	-1	-1	-3	-1
15. During leisure time I cycle...	-1	-1	-1	-3	-1
16. How many minutes per day do you walk and/or cycle to and from work, school and shopping?	-1	-1	-1	-3	-1
17. During leisure time I do do-it-yourself	-1	-1	-1	-3	-1

Item No.	Expert			Total	IC
	I	II	III		
activities...					
18. During leisure time I work in the garden...	-1	-1	-1	-3	-1
19. How many hours per day do you sleep on average?	-1	-1	-1	-3	-1

There were only 2 items that correlate well with the measured variable. In the first question that asked for the occupation, the 3 rating scale 1 – 3 – 5 was used. Three level of occupational physical activity was defined according to The Netherlands Nutrition Council. The low level for occupations were clerk work, driving, shop keeping, teaching, studying, housework, medical practice and all other occupations with a university education. The middle level for occupations was factory work, plumbing, carpentry and farming. The high level for occupations was dock work, construction work and sport. This rating scale was invalid for measuring the history of heavy object lifting because physical activity measurement was its main purpose. After discussion with the experts, this questionnaire was unsuitable for measuring the past history of heavy object lifting. Because this exposure variable was the main variable to evaluate in this study, then a newly developed questionnaire was constructed for completing measurement in this variable. Exercise information was added to collect the information about heavy object lifting in some kinds of exercise or sport that had a component of heavy object lifting such as weighting. The estimated weight of objects and duration of exposure were recorded and set as broad as possible to minimize the chance of misclassification.

3.9.2 Measurement for obesity

This measured variable can measure exactly using the classification of WHO. (25) There was some problem during estimating the body weight before appearance of the disease. The interviewers reduced this problem by asking the relatives of the subjects to reassure the accurate estimation.

3.9.3 Measurement for smoking

The questionnaire designed by WHO committee on study of smoking (26) was used to ask the cases and controls if they had smoked or not before the appearance of the diseases. In persons who smoked, the daily amount of tobacco consumption and the duration of exposure (in years) were recorded. The time when they stopped smoking was also notified in persons who had once smoked and had already quit. The amount and duration of exposure were recorded and set as broad as possible to minimize the chance of misclassification.

3.9.4 Measurement for past history of urinary outflow tract obstruction

By using the definition and guideline from the American Urological Association symptom index for benign prostatic hyperplasia 1992 (28) that had already translated into Thai version for measuring this variable. It consisted of 7 items that had 6-rating scale from 0 to 5 in each item. The item correlation was skipped. Then internal consistency reliability and criterion validity were evaluated in pilot study. The important kind of reliability testing in this setting was test for internal consistency. In pilot testing, 43 subjects in department of surgery were enrolled. The diagnoses of all patients were obscured for blinding the researcher and two urologists. After consenting to the pilot study, the researcher interviewed the patient face to face in the first day using this symptom index and two urologists evaluated the same patient for the definite diagnosis on the next day. When questions were combined to form an index, the internal consistency reliability of each index was examined with Cronbach's alpha statistic using computer program SPSS version 10. Criterion validity was based on the diagnosis from two urologists who revealed high inter-observer agreement.

The formula for calculation of Cronbach's alpha coefficient is as followed: (34,35)

$$\alpha = \frac{n}{n-1} \left(1 - \frac{\sum S_i^2}{S_x^2} \right)$$

$$S_i^2 = \frac{\sum (X - \bar{X})^2}{n-1} = \text{item variance}$$

$$S_x^2 = \frac{n \sum X_x^2 - \sum X_x^2}{n(n-1)} = \text{total variance}$$

n = number of items

The calculation revealed the Cronbach's alpha coefficient of 0.8928. The obtained results indicated the good reliability (alpha exceeded 0.8) of the scale. (34,35) The details of the reliability testing using Cronbach's alpha coefficient as an indicator are demonstrated in table 4.

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Table 4: The item-total statistics of the symptom index for urinary outflow tract obstruction

	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Alpha if item deleted
1. During the last month or so, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	7.1395	56.8372	.5985	.8883
2. During the last month or so, how often have you had to urinate again less than 2 hours after you finished urinating?	6.5814	50.2968	.8061	.8622
3. During the last month or so, how often have you found you stopped and started again several times when you urinated?	7.3953	55.2447	.7442	.8709
4. During the last month or so, how often have you found it difficult to postpone urination?	7.4419	53.3477	.7962	.8641
5. During the last month or so, how often have you had a weak urinary stream?	7.3256	53.9867	.7016	.8759
6. During the last month or so, how often have you had to push or strain to begin urination?	7.7209	62.9203	.5445	.8930
7. During the last month or so, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	5.6512	56.3754	.6601	.8806

After that, the criterion validity of this questionnaire was tested. The two qualified urologists evaluated the diagnosis of urinary outflow tract obstruction

from clinical symptoms that is the gold standard for this symptom index. Then, Kappa statistic was used to test the agreement between two urologists. Table 5 showed the agreement on diagnosis between two urologists.

Table 5: Observe frequencies on diagnosis of urinary outflow tract obstruction by two urologists

		Urologist 2		Total
		No	Yes	
Urologist 1	No	31	1	32
	Yes	1	10	11
Total		32	11	43

The formula for calculation of reliability for inter-observer agreement was as follow: (36,37)

$$\text{Kappa} = \frac{P_o - P_e}{1 - P_e}$$

$$P_o = \text{Observed agreement}$$

$$= \sum_{i=1}^k n_{ii} / n_{++}$$

$$= (31 + 10)/43 = 0.95$$

$$P_e = \text{Chance-expected agreement}$$

$$= \sum_{i=1}^k n_{+i} / n^2_{++}$$

$$= [(31 \times 31) + (10 \times 10)] / 43^2$$

$$= 0.54$$

$$\text{Kappa} = 0.95 - 0.54 / 1 - 0.54$$

$$= 0.89$$

The Kappa statistic was 0.89 that revealed very good agreement as shown in table 6. (36,37)

Table 6: The interpretations of agreement

Value of Kappa	Strength of agreement
< 0.20	Poor
0.21 – 0.40	Fair
0.41 – 0.60	Moderate
0.61 -- 0.80	Good
0.81 – 1.00	Very good

Criterion validity was evaluated by comparing the diagnosis of urinary outflow tract obstruction between clinical diagnosis from two qualified urologists and this symptom index. The sensitivity, specificity and roc curve were evaluated to find the suitable cut-off point using STATA software as shown in table 7 and figure 1.

Table 7: Sensitivity and specificity of symptom index for urinary outflow tract obstruction

Cut point	Sensitivity	Specificity	Classified	LR+	LR-
(>= 3)	100.00%	32.26%	51.16%	1.4762	0.0000
(>= 4)	100.00%	54.84%	67.44%	2.2143	0.0000
(>= 5)	100.00%	67.74%	76.74%	3.1000	0.0000
(>= 6)	91.67%	74.19%	79.07%	3.5521	0.1123
(>= 7)	83.33%	80.65%	81.40%	4.3056	0.2067
(>= 8)	75.00%	80.65%	79.07%	3.8750	0.3100
(>= 9)	75.00%	87.10%	83.72%	5.8125	0.2870
(>= 10)	66.67%	93.55%	86.05%	10.3333	0.3563
(>= 12)	58.33%	93.55%	83.72%	9.0417	0.4454

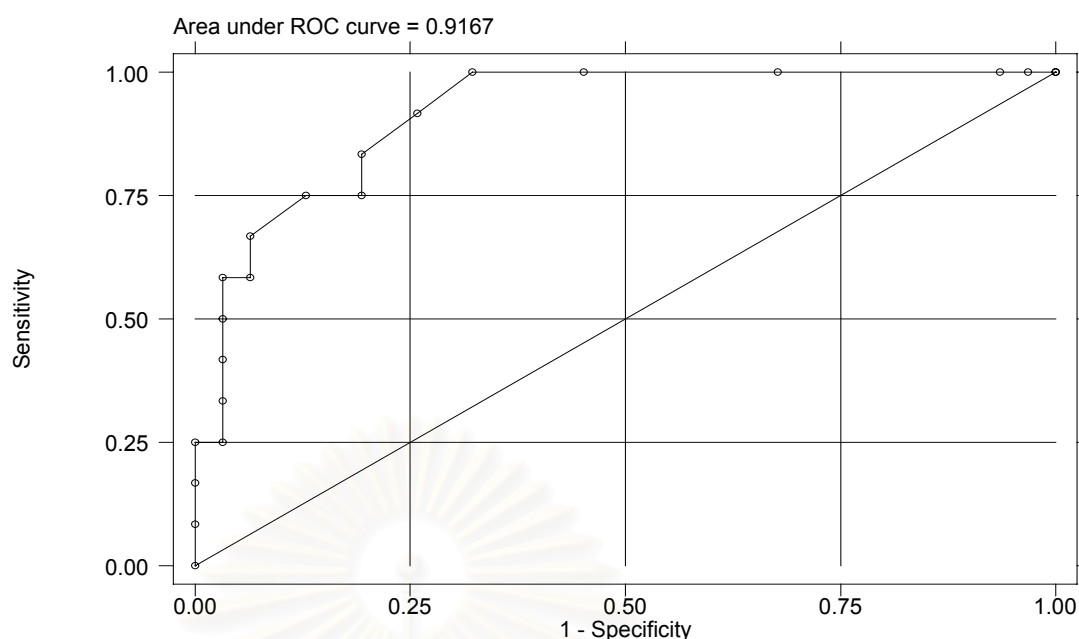


Figure 1: A receiver operating characteristic curve of symptom index for urinary outflow tract obstruction

The area under ROC curve was 0.9167 (95%CI = 0.84 – 1.0). Then, the cut-off point ≥ 7 points were selected for measuring this variable.

3.9.5 Past history of constipation before appearance of the disease

Constipation is a common condition that the diagnosis is depended on various symptoms. By using the result from previous studies, the normal bowel frequency may be defined as bowel movements between 3 times per week and three times per day. (30,31) The constipation was justified when the frequency was less than normal associated with very hard stool and often used of laxative agents. Firstly, several different symptoms existing in constipation were selected and tested for validity and reliability. Validity concerns the extent to which an instrument measures what it is intended to measure. Content validity refers to the adequacy with which the universe of content is sampled by a test. To verify content validity of the proposed measuring tool, copies of newly developed questionnaire in Thai version was sent to 3 experts in gastroenterology and colo-rectal surgery to evaluate the content and give the score for each item. All experts were asked to evaluate the relevance and the adequacy of this questionnaire to measures

constipation symptoms. The results of this content validity testing are shown in table 8.

Table 8: Results of content validity testing of symptom index for constipation

Item No.	Expert			Total	IC
	I	II	III		
1. How many times in the week did you open your bowels?	+1	+1	+1	3	1
2. What was the most common characteristic of your stool?	+1	+1	+1	3	1
3. How often have you had to push or strain to open your bowel?	+1	+1	+1	3	1
4. On the average, how many minutes did you use in each open your bowel?	+1	+1	+1	3	1
5. How often did you have painful symptom at your anus during passing stools?	+1	+1	+1	3	1
6. How often did you have abdominal pain during passing stools?	-1	-1	-1	0	0
7. How often did you have red bleeding during passing stools?	+1	-1	-1	-1	-0.3
8. How often did you use the laxative agent ?	+1	+1	+1	3	1
9. How did you classify your constipation symptoms?	+1	+1	+1	3	1
10. Did you suffer in your constipation symptoms?	0	+1	+1	2	0.6
11. How often did you seek the physicians?	+1	+1	+1	3	1

The result shown in the above table indicated the expert's acceptability of the questionnaire. After that, the important kind of reliability testing in this setting is test for internal consistency. The item 6, 7 and 10 were deleted. In this study, 5-rating scale was used in 8 items (item No. 1 -5, 8, 9, 11). The 43 subjects in

department of surgery were enrolled for this pilot study. The diagnoses of all patients were obscured for blinding the researcher and two experts in gastrointestinal diseases. After consenting to the pilot study, the researcher interviewed the patient face to face in the first day using the 5 - rating scale of 8 items and two experts in gastrointestinal diseases evaluated the same patient for the definite diagnosis on the next day. The distributions of answers were examined for individual questions to determine if subjects spread their answers across the entire response frame. When questions were combined to form an index, the internal consistency reliability of each index was examined with Cronbach's alpha coefficient statistic using computer program SPSS version 10. Criterion validity was based on the diagnosis from two experts in gastrointestinal diseases who revealed high inter-observer agreement.

The calculation revealed the Cronbach's alpha coefficient of 0.8712. The obtained results indicated the good reliability (the Cronbach's alpha coefficient exceeded 0.8) of the scale. (36,37) The details of the reliability testing using Cronbach's alpha coefficient as an indicator are demonstrated in table 9.



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Table 9: The item-total statistics of the symptom index for constipation

Item number	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Alpha if item deleted
1. How many times in the week did you open your bowels?	11.0930	22.4673	.4419	.8753
2. What was the most common characteristic of your stool?	11.0698	19.5903	.6988	.8474
3. How often have you had to push or strain to open your bowel?	11.4186	17.7730	.7948	.8358
4. On the average, how many minutes did you use in each open your bowel?	11.6744	19.5105	.7346	.8427
5. How often did you have painful symptom at your anus during passing stools?	11.7907	19.6456	.7289	.8434
8. How often did you use the laxative agent?	12.0000	23.7619	.5155	.8675
9. How did you classify your constipation symptoms?	11.9535	21.0930	.7930	.8410
11. How often did you seek the physicians?	12.2791	25.6822	.4535	.8774

Kappa's statistic was used for testing agreement on diagnosis between two experts in gastrointestinal diseases. The observe frequencies on diagnosis of constipation are shown in table 10.

Table 10: Observe frequencies on diagnosis of constipation by two experts

		Physician 2		Total
		No	Yes	
Physician 1	No	38	0	38
	Yes	0	5	5
Total		38	5	43

The Kappa statistic was equal to one that was very good agreement. The next step of evaluation was criterion validity. Criterion validity was evaluated by comparing the diagnosis of constipation between two experienced in gastrointestinal disease and this symptom index. The sensitivity, specificity and roc curve were evaluated to find the suitable cut-off point using STATA software as shown in table 11 and figure 2.

Table 11: Sensitivity and specificity of the symptom index for constipation

Cut point	Sensitivity	Specificity	Classified	LR+	LR-
(>= 15)	100.00%	81.58%	83.72%	5.4286	0.0000
(>= 16)	80.00%	92.11%	90.70%	10.1333	0.2171
(>= 17)	80.00%	94.74%	93.02%	15.2000	0.2111
(>= 21)	80.00%	97.37%	95.35%	30.3999	0.2054
(>= 31)	60.00%	100.00%	95.35%		0.4000
(>= 33)	40.00%	100.00%	93.02%		0.6000
(> 33)	0.00%	100.00%	88.37%		1.0000

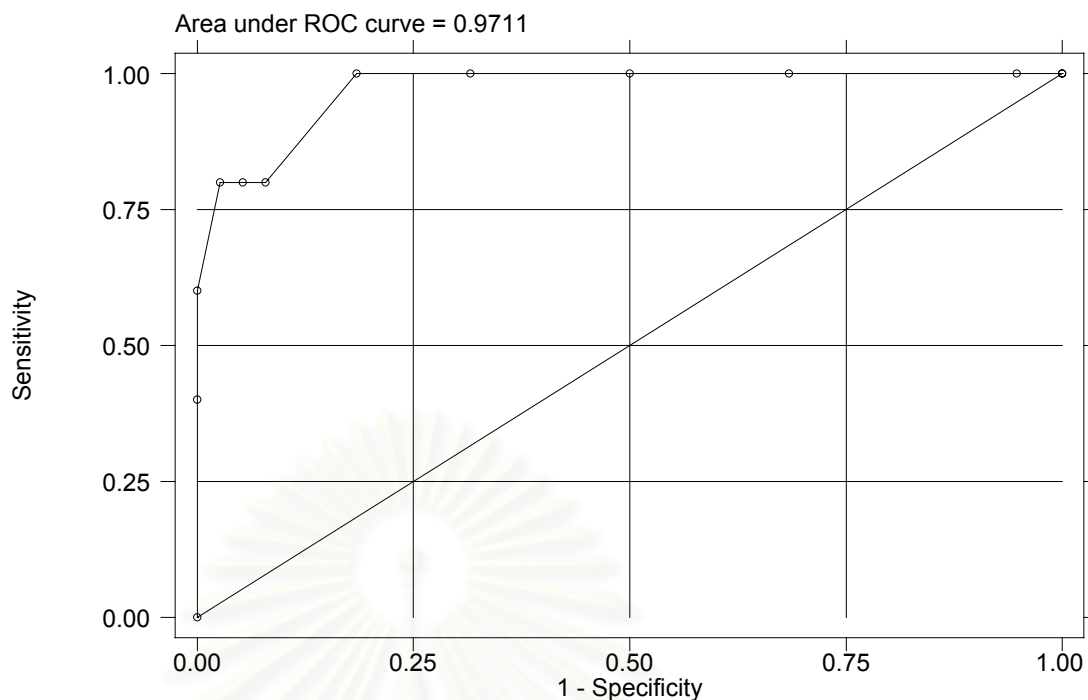


Figure 2: A receiver operating characteristic curve of symptom index for constipation

The area under ROC curve was 0.9711 (95%CI = 0.91591 - 1.00000). The cut-off point ≥ 21 points were selected for measuring this variable.

3.9.6 Past history of appendectomy through the right lower abdominal incision

This variable was recorded after history taken and abdominal examination. The types of surgical incision in right lower abdominal region and the kinds of operation were recorded. In cases, this variable would be considered when the affected side of inguinal hernia was on the same right side.

3.9.7 Familial history of inguinal hernia

This variable was evaluated by interviewing about inguinal hernia only in first degree beyond the subjects. The pilot study was planned to check the validity of the result. After pilot study in 30 patients, the proportion of unknown answer was rather high especially in elderly subjects as shown in table 12.

Table 12: Result of answers about first-degree family history of inguinal hernia

Family history of inguinal hernia	No. (%)
1. Yes	2 (6.6)
2. No	16 (53.4)
3. Undetermined/Unknown	12 (40)
Total	30 (100)

This variable was very difficult to evaluate especially in elderly subjects. Although their relatives were requested to solve this problem, the result was not different. Concerning about the validity of measuring, this variable was deleted from the study due to very high missing value.

3.10 Possible sources of bias and prevention

There are many sources of biases in case-control study, which leading to distortion and invalidity of the result. The definition of cases was clear in this study because it could be confirmed at the time of operation to prevent selection bias. Controlling the age variables in control group by group matching within 5-year interval to the cases and selected the control group within the same month of admission. Both cases and controls were not aware of all hypotheses to lesson information bias and concomitants checking the answers with their relatives. Only new diagnoses with the onset on symptoms less than 1 year were selected. Then the recall bias could be minimized. The personals who got the data from the records and interviewed the patients were not aware of the objectives of the study to prevent measurement bias. The main instrument in this study that was the questionnaire that was constructed by using guidelines from the standard questionnaires in each risk factors and test for validity and reliability.

3.11 Measurement deals with measures of disease occurrence

Relative risk: It represents how many times more (or less) likely disease occurs in the exposed group as compared with the unexposed. In a case-control design, we start

with the number of selected cases and controls. Then it is not directly measured. Instead of relative risk, the odd ratio approximation is used.

Odds ratio: This represents the ratio of the odds of disease in exposed individuals relative to the unexposed. This is particularly important for two reasons:

- For rare diseases, it closely approximates the relative risk
- It can be determined in a case-control study

Table 13: Relationship of disease risk in exposed group/disease risk in non-exposed group

Odds ratio	Interpretation
0 - 0.3	Strong benefit
0.4 - 0.6	Moderate benefit
0.7 - 0.8	Weak benefit
0.9 - 1.1	No effort
1.2 - 1.6	Weak hazard
1.7 - 2.9	Moderate hazard
≥ 3	Strong hazard

3.12 Data collection

3.12.1 Pilot testing after reliability and validity testing the measured instrument in each variable, a small scale feasibility questionnaire in Thai version that composed of various instruments for each variable was developed. The small handbook for data gathering was prepared. Face-to-face interviewing with the prepared questionnaire was used for obtaining data about exposure variables in each subject to reduce misunderstanding about the meaning of questions and maximize the collection of usable data.

3.12.2 The three interviewers in each hospital were trained in the all criteria used in this study and were fully supervised and regularly monitored by the principal investigator. Pilot study for all interviewers was evaluated before the actual schedule to rescue any otherwise problematic research effort. This allowed for any possible alteration or revision in the instrument. The small guideline for

interviewing was created to help the interviewers. Computer program for data editing and statistical analysis was prepared early, before receipting the data.

3.12.3 The missing value during the process of data collection was corrected as much as possible by re-interviewing and searching the data from medical records. During the process of instrument development, the proposal was sent to the IRB and ethical committee of all three hospitals. Approval from the Medical director was obtained after the research proposal passed the approval of the IRB.

3.13 Data analysis

3.13.1 Demographic and baseline variables

Demographic and baseline data of patients in all three groups such as: age, weight, height, marital status, education, occupations are demonstrated as summarized in table 14.

Table 14: Descriptive statistics for demographic and baseline variables.

Variables	Statistics
1. Age (years)	Range, mean, S.D.
2. Marital status	Proportion, Pearson's chi-square
3. Education	Proportion, Pearson's chi-square
4. Occupation	Proportion, Pearson's chi-square
5. Weight (kg)	Range, mean, S.D., independent <i>t</i> -test
6. Height (cm)	Range, mean, S.D., independent <i>t</i> -test
7. BMI (kg/m ²)	Range, mean, S.D., independent <i>t</i> -test
8. Diagnosis of the diseases	Proportion
9. Duration of the diseases	Proportion

3.13.2 Exposure variables

The exposure variables were described and tested for the association between cases and controls using the appropriate statistics as shown in table 15.

Table 15: Association testing between exposure variables and the dependent variables

Variables	Type of data	Statistics
1. Heavy object lifting	Ordinal	Chi- square for trend
2. Obesity	Ordinal	Chi- square for trend
3. Smoking	Ordinal	Chi- square for trend
4. Urinary outflow tract obstruction	Binary	Pearson's chi-square
5. Constipation	Binary	Pearson's chi-square
6. Chronic cough	Binary	Pearson's chi-square
7. Appendectomy through right lower abdominal incision	Binary	Pearson's chi-square

Magnitude of association between each independent variables and the dependent variable were tested and showed as crude odds ratio with 95% confidence interval using cross tabulation. Magnitude of association between each significant variable with simultaneously effect of other significant variables and the dependent variable were tested and showed as adjusted odds ratio with 95% confidence interval using unconditional multiple logistic regression. This is the appropriate test because the study involved exploration of inguinal hernia patients and the effects of a number of variables. Potential confounding variables were investigated by using the difference between deviances of the models with and without the variable. All data analysis were evaluated by using STATA statistical program (STATA Version 7, Stata Corp.). A two-sided p-value of <0.05 would be considered as statistically significant.

3.14 Ethical consideration

Although this case-control study did not involve administering or withholding the therapies, it obtained personal information. The investigators obtained an individual's consent before entering him into the study and individual understood the general nature and purpose of the study. The protocol and questionnaire were reviewed and approved by the ethical committee. All data collected from each individual were kept in confidence. There was no other ethical problems encountered in the conduct of the research.



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CHAPTER 4

RESULT

4.1 Demographic and baseline variables

There were 219 patients enrolled in this study, 73 patients as cases and 146 patients as controls. All cases and controls were recruited from three general hospitals in Bangkok Metropolis. All cases and controls were selected when duration of the presented diseases was less than 12 months. The diagnoses of all cases and controls and duration of diseases are demonstrated in table 16. Table 17 – 18 showed the distribution of demographic characteristics included age, body weight, height, BMI, marital status, education and occupation.

Table 16: The distribution of diagnoses among cases and controls

Diagnoses	Case: n (%)
Right indirect inguinal hernia	38 (52.1)
Left indirect inguinal hernia	23 (31.5)
Right direct inguinal hernia	3 (4.1)
Left direct inguinal hernia	1 (1.4)
Unilateral direct and indirect inguinal hernia	2 (2.7)
Bilateral direct inguinal hernia	1 (1.4)
Bilateral indirect inguinal hernia	5 (6.8)
Total	73 (100)
Diagnoses	Control: n (%)
Gastrointestinal diseases	74 (50.7)
Soft tissue diseases	37 (25.3)
Vascular diseases	2 (1.4)
Ophthalmologic diseases	33 (22.6)
Total	146 (100)

Table 17: The demographic characteristics of cases and controls

	Case	Control	p-value
Age (yrs.)	54.2 (16.69) [16.1, 79.1]	54.2 (16.48) [16.6, 80.4]	-
Age categorized (yrs.)	n (%)	n (%)	
15 - 30	8 (11)	14 (9.6)	
31 - 45	13 (17.8)	30 (20.5)	
46 - 60	19 (26)	36 (24.7)	-
> 60	33 (45.2)	66 (45.2)	
Total	73 (100)	146 (100)	
Duration of diseases	n (%)	n (%)	
< 3 months	24 (32.9)	95 (65.1)	
≥3 months - <6 months	16 (21.9)	10 (6.8)	
≥6 months - <9months	14 (19.2)	24 (16.4)	-
≥9months - <12 months	19 (26.0)	17 (11.6)	
Total	73 (100)	146 (100)	
Height (centimeter)	165 (7.06) [148, 184]	165 (6.67) [150, 185]	{0.39}
Weight (kg.)	62.88 (10.29) [44, 95]	63.33 (10.29) [39, 100]	{0.79}
BMI (kg/m ²)	22.79 (3.11) [16.56, 32.87]	23.22 (4.08) [14.33, 36.26]	{0.43}

Values are expressed as (%), mean (SD), [minimum, maximum] and

{p-value of independent *t*-test }

Table 18: Distribution of marital status, education and occupation among cases and controls

Data	Case n (%)	Control n (%)	Odds ratio (95%CI) {p-value}
Marital status			
- Single	12 (16.4)	27 (18.5)	1
- Marriage	51 (69.9)	102 (69.9)	1.13 (0.5 – 2.65)
- Widow/separate	10 (13.7)	17 (11.6)	1.32 (0.41 – 4.2)
Total	73(100)	146(100)	{0.87}
Dichotomized marital status			
- Single	22 (30.1)	44 (30.1)	1
- Couple	51 (69.9)	102 (69.9)	1 (0.52 – 1.95)
Total	73(100)	146(100)	{1.00}
Education			
- Never/illiterate	2 (2.7)	6 (4.1)	1
- Elementary	34 (46.6)	67 (45.9)	1.52 (0.25 – 16.1)
- High school	20 (27.4)	42 (28.8)	1.43 (0.23 - 15.62)
- Vocational school/college	6 (8.2)	20 (13.7)	0.9 (0.11 – 11.43)
- University or higher	11 (15.1)	11 (7.5)	3 (0.4 – 35.51)
Total	73 (100)	146 (100)	{0.37}
Dichotomized education			
- Elementary/illiterate	36 (49.3)	73 (50.0)	1
- High school and higher	37 (50.7)	73 (50.0)	1.03 (0.56 – 1.87)
Total	73 (100)	146 (100)	{0.92}
Occupation			
-Unemployed/professional	13 (17.8)	24 (16.5)	1
-Skilled labour/worker	51 (69.9)	91 (62.3)	1.03 (0.46 – 2.41)
-Agriculture	4 (5.5)	13 (8.9)	0.57 (0.11 – 2.39)
-Unskilled labour	5 (6.8)	18 (12.3)	0.51(0.12 – 1.92)
Total	73 (100)	146 (100)	{0.46}

Data	Case n (%)	Control n (%)	Odds ratio (95%CI) {p-value}
Dichotomized occupation			
- Unemployed/skilled labour/professional	64 (87.7)	115 (78.8)	1
- Agriculture/unskilled labour	9 (12.3)	31 (21.2)	0.52 (0.21 – 1.21)
Total	73 (100)	146 (100)	{0.11}

Values are expressed as n (%) and {p-value of Pearson's chi-square test}

From the above table, more than 90 percent of cases were indirect inguinal hernia and the more affected side was on the right. Femoral hernia was not found in this study. This picture was different from the other countries that femoral hernia was much more than in this study. (7, 8) Majorities of cases were in sixth and seventh decades. The height, weight and BMI of cases were similar to the controls. Elementary and high school were the common distribution of education in both groups. The major occupations were skilled labour and worker in both groups. Marital status, education and occupation were not found to be statistically significant association with inguinal hernia.

4.2 Univariate (crude) analysis

This part was to determine, separately, the effect of each factor on inguinal hernia ignoring the effect of other factors. It served as a good tool for screening potential predictors to be the candidate to be entered into the initial model. Variables that had the p-value of 0.2 or lower would be considered to put in the model. However, the variables that had the p-value exceed 0.2 but were known to have an effect on the outcome were also considered. Table.19 showed the results of univariate analysis in crude odds ratio for inguinal hernia in relation to all measured variables.

Table 19: Association and magnitude of association between each exposure variables and inguinal hernia

Exposure variables	No. Cases	No. Controls	Odds ratio	95% CI [p-value], {p-value}
Level of heavy object lifting (classified by weight)				
- No lifting	17	39	1	
- Light level	21	34	1.42	0.6 – 3.36
- Medium level	15	22	1.56	0.6 – 4.07
- Heavy level	20	51	0.89	0.39 - 2.09
Total	73	146		[0.9]
Duration of heavy object lifting				
- No lifting	17	39	1	
- >0 - 10 yrs.	16	32	1.15	0.46 – 2.84
- 11 - 20 yrs.	11	21	1.2	0.42 – 3.32
- >20 yrs.	29	54	1.23	0.56 – 2.74
Total	73	146		[0.59]
Heavy object lifting				
- No	17	39	1	
- Yes	56	107	1.2	0.6 – 2.47
Total	73	146		{ 0.58 }
BMI categories				
- Underweight	4	14	1	
- Normal	55	93	2.07	0.61 – 9.03
- Overweight	11	31	1.24	0.3 – 6.27
- Obesity	3	8	1.31	0.15 – 10.01
Total	73	146		[0.61]
Obesity categories				
- Underweight / normal	59	107	1	
- Overweight / obesity	14	39	0.65	0.3 – 1.35
Total	73	146		{0.22}

Exposure variables	No. Cases	No. Controls	Odds ratio	95% CI [p-value], {p-value}
Smoking (duration of smoking in years)				
- 0	24	51	1	
- >0 - 10 yrs.	3	12	0.53	0.9 – 2.24
- 11 - 20 yrs.	12	13	1.96	0.7 – 5.44
- >20 yrs.	18	47	0.81	0.37 – 1.79
Total	73	146		[0.87]
Number of cigarettes/day				
- 0	24	51	1	
- >0 - 10 cigarettes/day	28	58	1.03	0.5 – 2.1
- 11 - 20 cigarettes/day	17	26	1.39	0.59 – 3.25
- >20 cigarettes/day	4	11	0.77	0.16 – 2.97
Total	73	146		[0.79]
Smoking				
- No	24	51	1	
- Yes	49	95	1.09	0.58 – 2.09
Total	73	146		{0.76}
Urinary outflow tract obstruction				
- No	52	105	1	
- Yes	21	41	1.03	0.52 – 2.0
Total	73	146		{0.92}
Constipation				
- No	65	134	1	
- Yes	8	12	1.37	0.46 – 3.85
Total	73	146		{0.51}

Exposure variables	No. Cases	No. Controls	Odds ratio	95% CI [p-value], {p-value}
Chronic cough				
- No	68	138	1	
- Yes	5	8	1.27	0.31 – 4.59
Total	73	146		{0.69}
Increased intra-abdominal pressure				
- No	44	90	1	
- Yes	29	56	1.06	0.57 – 1.96
Total	73	146		{0.84}
Appendectomy through right lower abdominal incision				
No	67	136	1	
Yes	6	10	1.22	0.35 – 3.88
Total	73	146		{0.71}

Values are expressed [p-value of Chi-square for trend] and {p-value of Pearson's chi-square test}

The results from univariate analysis, showed that no relation with inguinal hernia was found for all categorized of past history in heavy object lifting. Then, this exposure variable was dichotomized into two. The crude odds ratio was 1.2 (95%CI 0.6 – 2.47). BMI was categorized into 4 groups included underweight, normal, overweight and obesity. These finding can conclude that the distribution of cases and controls across 4 categories of BMI was not different. From the above result, there were three cells with very small numbers in underweight and obesity. This could cause a problem in modeling. Aside the two categories were collapsed and still meaningful for the next step of analysis due to its more informative. The same result was found in smoking. Therefore BMI and smoking were collapsed into 2 groups (underweight/normal weight and overweight /obesity, no smoking and smoking). There was no statistically significant for association between obesity, smoking and inguinal hernia.

For exposure variables that were the cause of increased intra-abdominal pressure, there were no statistically significant relationship between these three exposure variables and inguinal hernia. Then cases and controls that had any one of these exposures were classified as increased intra-abdominal pressure. There was no association between increased intra-abdominal pressure and inguinal hernia too. Previous appendectomy through right lower abdominal incision was not statistically significant associated with inguinal hernia. Summary from univariate analysis, statistically significance association between all measured variables and inguinal hernia was not found.

Each exposure variables were combined together to assess as combined risk. The results of univariate analysis showed that multiple combined variables were not statistically significant associated with inguinal hernia again. These findings were similar to matched-analysis with McNemar's test. Based on the objective of the study, past history of heavy object lifting was an exposure of interest and the exposures that associated with inguinal hernia from literature review were obesity, increased intra-abdominal pressure, smoking and previous appendectomy through right lower abdominal incision were selected for the next step of analysis.

4.3 Stratified analysis

The next step of analysis was stratified analysis to examine confounding and interaction effect for possible combination of the exposures. By this analysis, any joint effect of the variables was evaluated. Thus all stratified analysis were evaluated to assess the effect of the other exposures on the association between each variables and inguinal hernia. After analysis, neither interaction nor confounding effects of all exposure variables were found.

4.4 Multiple variable analysis using unconditional multiple logistic regression

This step of analysis was evaluation the effect of each variable on inguinal hernia adjusted simultaneously for effect of other variables. From univariate analysis, any variable that univariate test had a p-value less than 0.2 should be considered as a candidate for the multivariable model along with all variables of known biologic

importance or of particular interest. The p-value of less than 0.2 is recommended as a selection criteria have shown that using a lower level (eg. the traditional 0.05 level) often fails to identify variables known to be important. The result from univariate analysis showed that no statistically significant association between all exposure variables and inguinal hernia was found.

Then heavy object lifting, obesity, smoking, increased intra-abdominal pressure and previous appendectomy were selected for the multivariable model due to particular interest and significant risk factors from previous studies. (8, 9) To adjust the effect of all measured variables, all main effects were selected into the model and the result was demonstrated in the table 20, 21. The result from full model, forward stepwise and backward stepwise were not different.

Table 20: The result from STATA version 7

. logistic hernia heavylif obesity smoke appendec abdopres						
Logit estimate		Number of obs = 219				
		LR chi2 (5) = 1.97				
		Prob > chi2 = 0.8536				
Log likelihood = -138.41261		Pseudo R2 = 0.0071				
hernia	Odds ratio	Std.Err	Z	P> Z	(95% Conf. Interval)	
heavylif	1.134913	.3914129	0.40	0.722	0.584295	2.223755
obesity	0.658004	.2329238	-1.18	0.233	0.328788	1.316866
smoke	1.034570	.3266538	0.14	0.944	0.554127	1.908888
appendec	1.285070	.6908553	0.45	0.654	0.440897	3.721874
abdopres	1.046606	.3123003	0.15	0.864	0.588163	1.899348

Table 21: Crude odds ratios and odds ratios adjusted for the effect of other exposure variables

Exposure variables	Case (%)	Control (%)	Crude Odds ratio	Adjusted Odds ratio	95%CI	p-value
1. History of heavy object lifting						
● Non	23.3	26.7	1	1†		
● Heavy object lifting	76.7	73.3	1.2	1.13	0.58 – 2.22	0.72
2. Obesity						
● Underweight/normal weight	80.8	73.3	1	1†		
● Overweight/obesity	19.2	26.7	0.65	0.66	0.33 – 1.32	0.23
3. Smoking						
● Non-smoker	32.9	34.9	1	1†		
● Smoker	67.1	65.1	1.09	1.03	0.55 – 1.9	0.94
4. Increased intra-abdominal pressure						
● No	60.3	61.6	1	1†		
● Yes	39.7	38.4	1.06	1.05	0.59 – 1.9	0.86
5. Previous appendectomy						
● No	91.8	93.2	1	1†		
● Yes	8.2	6.8	1.22	1.29	0.44 – 3.72	0.65

*Odds ratios were adjusted for all other variables shown in the table 20

†Reference category

The STATA result from table 20 showed the value of Prob > chi2 = 0.8536. This value showed that all exposure variables in this model were not a good association to inguinal hernia.

A case-control study on risk factors associated with inguinal hernia in adult male according to past history of heavy object lifting, obesity, smoking, increased intra-abdominal pressure and previous appendectomy through right lower abdominal incision involved 73 cases and 146 controls from three general hospital in Bangkok Metropolis. In an exploratory data analysis, the effect of each exposure variable on inguinal hernia was evaluated. In summary, after adjusting for the effect of all other exposure variables were assessed. There were no statistically significant association between all exposure variables and inguinal hernia. Obesity had a protective trend and the other factors had a trend to increase risk. The similarity between crude odds ratios and adjusted odds ratio suggested that there was no confounding effect of all variables presented in the table 21.



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CHAPTER 5

DISCUSSION AND CONCLUSION

Discussion

Development of inguinal hernia depends on numerous factor, mostly concerns inguinal hernia and operative characteristics, which had been obtained by review of case series or clinical trials. Many previous studies on its etiology were uncontrolled and retrospective analysis that had less evidence than the other form of studies. Only little was known about risk factors for inguinal hernia. This case-control study evaluated past history of heavy object lifting and the other potential risk factors as reported in the literature. Measuring past history of heavy object lifting was a difficult part to evaluate and interpretation. Male and older ages are already known as the main risk factors of inguinal hernia. After controlling these two factors, nothing was found to be significantly associated with inguinal hernia. The genetic factor that is one of the potential factors from previous study was not included in this study because of very high proportion of missing value although rechecking with their relatives. These finding were contrast to the main risk factor that had been reported to be associated with inguinal hernia, lifting heavy object for a long period of times. (8) The weak points of that study were retrospective selection of cases who underwent hernia surgery in a period of three years before the study and effort score from working and playing were recorded. This could produce a lot of information bias and recall bias because inguinal hernia can manifest for a long time before admission. The other disadvantage of previous study was data collection by mailing questionnaires that many measurements for exposure variables may be incorrect or misclassification.

Many peoples believe that heavy object lifting is the main cause of inguinal hernia. The result from this study was contrast to their believe. This factor should be considered as the precipitating for migrating of intra-abdominal viscera into the already existed inguinal hernia rather than a causative factor.

Concerning about increased intra-abdominal pressure as an etiologic factor that was mentioned in many documents, (2, 7, 9, 12, 13) there were no statistically significant association between urinary outflow tract obstruction, constipation, chronic cough and

inguinal hernia in this study. Most of these documents were retrospective descriptive and retrospective analytical study that had less evidence support than the case-control study. The previously case-control study that revealed significant risk factor of constipation (9), this may be come from methodology because the measurements of these exposure variables were only asking the questions with two responses (yes or no). It is invalid for measuring these exposure variables that the diagnosis depended on various symptoms. In urinary outflow tract obstruction, the most common disease is benign prostatic hypertrophy that is common in aging male. The case with ascites that was the other cause of increased intra-abdominal pressure was not found in this study. These two diseases can manifest at the same period because both are the diseases of aging.

Although some studies emphasized about substances in cigarette smoke inactivate antiprotease in lung tissue and so upset the protease/antiprotease system, which is responsible for the integrity of the lung tissue leading to its destruction and emphysematous change. This mechanism brings to destruction of elastin and collagen of the rectus sheath and transversalis fascia and so cause their attenuation and predispose to herniation in cigarette smokers. (10,11) In this study, smoking was not associated with inguinal hernia.

There were strong association between congenital connective tissue disorders such as Marfan's, Ehlers-Danlos syndromes causing a deficiency of collagen and structural abnormalities of the collagen fibers, predisposing to inguinal hernias. Hereditary also plays a part in the development of inguinal hernias as evidenced by the high incidence of hernias in several generations of a family above that of the general population. (6,7,8) Then, hereditary factors that involved collagen metabolism directly relate with inguinal hernia but accurate collecting the data about inguinal hernia in family is very difficult. The further etiological study of inguinal hernia should concentrate in these hereditary factors.

In 73 cases of inguinal hernia, femoral hernia was not found in this study. This finding was quite different from the western countries. Epidemiologic study of inguinal hernia should be planned too. The last concern was the absence of statistical power. However, based on available data, the odds ratio of 1.2 for heavy object lifting with a two-sided significance level of 0.05 and the proportion of heavy object lifting in control that

equal to 0.73, the statistical power of 71.84 percent could be detected. To achieve 80 percent statistical power, the sample size should be 88 cases and 176 controls.

Finally, this study did not provide enough evidence that past history of heavy object lifting, smoking, increased intra-abdominal pressure and previous appendectomy increased risk of inguinal hernia in adult male. The same with obesity did not decrease risk of inguinal hernia in adult male.

Limitation

The primary limitation of this study is the inherent limitation of the case-control design. Since this study was a hospital-based, case-control study. This affected the validity of its conclusions. As mentioned above, all cases and controls were recruited only patients in central part of Thailand especially Bangkok. It was not able to generalize this finding to the whole country and the result might not be able to compare with community-based study. One of the serious limitations was the capacity of the subjects to remember the exposure variables correctly. But many attempts were tried to minimize the potential bias and misclassification as much as possible. All cases and controls were new diagnoses and the questionnaire had been validated. Recall bias would have resulted in cases overestimating their suspected risk factors. That could have led to overestimation of these risk factors. The results showed that nothing of all studied risk factors were associated with inguinal hernia. The other limitation is the reliability and validity of some information that depended on the individual's ability to remember history on past exposures. However, this potential bias had been obviated in part by checking the answers with their relatives.

Conclusion

This current study showed that past history of heavy object lifting, obesity, smoking, urinary outflow tract obstruction, constipation, chronic cough and previous appendectomy through right lower abdominal incision had not enough evidence to support its relation to inguinal hernia in adult male. Only age and sex, that already known to be the important risk factors, the further study should be encountered with the other factors that still unknown and difficult to measure especially genetic factor. Nowadays, heavy object lifting and increased intra-abdominal pressure are still convinced to be the risk factors or causations of inguinal hernia in many documents. These convinced documents are inappropriate because there was inadequate evidence to support.

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APPENDICES

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

APPENDIX 1

ASA PHYSICAL STATUS CLASSIFICATION

ASA 1 A normal healthy patient

ASA 2 A patient with a mild systemic disease (mild diabetes, controlled hypertension, anemia, chronic bronchitis, morbid obesity)

ASA 3 A patient with a severe systemic disease that limits activity (angina, obstructive pulmonary disease, prior myocardial infarction)

ASA 4 A patients with an incapacitating disease that is a constant threat to life (heart failure, renal failure)

ASA 5 A moribund patient not expected to survive 24 hours (ruptured aneurysm, head trauma with increasing intracranial pressure)

For emergency operation, add the letter E before classification



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

APPENDIX 2

APPENDIX 2.1: Definition of lifting and job classification from United States Department of Labor. (21)

Lifting – Raising or lowering an object from one level to another (includes upward pulling)

Carrying – Transporting an object, usually holding it in the hands or arms or on the shoulder

The strength rating is expressed by one of five terms: Sedentary, Light, Medium, Heavy and Very Heavy.

The frequency of job(s) is expressed by one of three terms: Occasionally = activity or condition exists up to 1/3 of the time, Frequently = activity or condition exists from 1/3 to 2/3 of the time and Constantly = activity or condition exists 2/3 or more of the time

Following are descriptions of the five terms in which the strength factor is expressed:

Sedentary work – Exerting up to 10 pounds (4.54kg) of force occasionally and/or a negligible amount of force frequently to lift, carry pull or otherwise move objects. Sedentary work involves sitting most of the time, but may involve walking or standing for brief periods of time. Jobs are sedentary if walking and standing are required only occasionally and all other sedentary criteria are met. (Such as secretary, draftsman, watchmaker, telephone operator, etc.)

Light work – Exerting up to 20pounds (9.09kg) of force occasionally, and/or up to 10pounds (4.54kg) of force frequently. A jobs should be rated Light Work: (1) when it requires walking of standing to a significant degree; or (2) when it requires sitting most of the time but entails pushing and/or pulling of arm or leg controls; and/or (3) when the job requires working at a production rate pace entailing the constant pushing and/or pulling of materials even though the weight of those materials in negligible. (Such as sales, clerk, bank teller, etc.)

Medium Work - Exerting 20 (9.09kg) to 50 (22.7kg) pounds of force occasionally, and/or 10 (4.54kg) to 25 (11.36kg) pounds of force frequently, and/or greater than negligible up to 10pounds (4.54kg) of force constantly to move objects. Physical

demand requirements are in excess of those for Light Work. (Such as auto mechanic, coin vending machine, serviceman, bus driver, etc.)

Heavy Work – Exerting 50 (22.7kg) to 100 (45kg) pounds of force occasionally and/or 25 (11.36kg) to 50 (22.7kg) pounds of force frequently, and/or 10 (4.54kg) to 20 (9.09kg) pounds of force constantly to move objects. Physical demand requirements are in excess of those for Medium Work. (Such as general laborer, millwright, bulldozer operator, baggage porter, etc.)

Very Heavy Work – Exerting in excess of 100pounds (45kg) of force occasionally and/ 09kg) of force constantly to move objects. Physical demand requirements are in excess or in excess of 50pounds (22.7kg) of force frequently, and/or in excess of 20pounds(9.of those for Heavy Work. (Such as loading dock worker, quarry miner, etc.)

APPENDIX2.2: International Labour Organization. Maximum weight in load lifting and carrying (20)

It is indicated that 55 kg is the recommended from an ergonomic point of view, of the admissible load for occasionally lifting and carrying for a male worker between 19 and 45 years of age. With regard to women, the maximum loads is 30 kg for work performed on level ground and 25 kg for work requiring climbing of a ladder or any elevated surface

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Appendix3: Consent Form

Name

H.NA.N.....

Address

Telephone

I agree to enroll on this study. I have well understood the general nature and purpose of the study and accepted voluntarily to provide my personal information. All of this information will be kept confidentially and none will be identified individually in any published reports. I may withdraw my consent at any time without notice

Subject's name.....

()

Researcher.....

()

Medical witness.....

()

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

ใบลงนามให้ความยินยอม

ข้าพเจ้านาย.....นามสกุล.....อายุ.....ปี
ที่อยู่.....

โทรศัพท์.....

ได้เข้าใจในวัตถุประสงค์ กระบวนการวิจัย และสมัครใจตกลงเข้าร่วมโครงการศึกษาวิจัยพร้อมทั้ง
ยินยอมที่จะให้ข้อมูลสำหรับการศึกษาวิจัยนี้ ข้าพเจ้ามีสิทธิ์ที่จะงดการเข้าร่วมโครงการวิจัยและ
การงดเข้าร่วมโครงการนี้จะไม่ผลกระทบต่อการให้บริการ หรือการรักษาที่ข้าพเจ้าจะได้รับแต่
อย่างไร ข้าพเจ้าได้รับทราบจากผู้วิจัยว่าจะไม่เปิดเผยข้อมูลหรือผลการวิจัยของข้าพเจ้าเป็นราย
บุคคลต่อสาธารณชน และใช้ข้อมูลที่ได้เพื่อเป็นประโยชน์ทางการแพทย์ การเปิดเผยข้อมูลเกี่ยวกับ
ข้าพเจ้าต่อหน่วยงานต่างๆกระทำได้เฉพาะกรณีจำเป็นด้วยเหตุผลทางวิชาการหรือกฎหมายเท่า
นั้น ซึ่งในกรณีดังกล่าวข้าพเจ้าจะไม่เรียกร้องค่าเสียหายใดๆทั้งสิ้น

ข้าพเจ้าได้รับทราบและได้ซักถามผู้วิจัยจนหมดข้อสงสัยโดยตลอด และยินดีเข้าร่วมวิจัย
จึงได้ลงลายมือไว้เป็นหลักฐานต่อหน้าพยาน

ลงนาม.....(ผู้ยินยอม)

()

...../...../.....

ลงนาม.....(ผู้ทำวิจัย)

()

...../...../.....

ลงนาม.....(พยาน)

()

...../...../.....

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Appendix4

Questionnaire (English version)

Number.....Date of birth.....

Interviewer.....Date interview.....

1. Personal information

1.1 Marital status

- 1.Single
- 2.Married
- 3.Divorced / Separated
- 4.Widowhood

1.2 Educational status

- 1.Never / Illiterate
- 2.Elementary (Prathomsuksa level1-6).....yr.
- 3.High school (Matayomsuksa level 1-6).....yr.
- 4.Vocational school / college.....yr.
- 5.University level or higher.....yr
- 6.Others, please specify.....

1.3 What is your present occupation?

- 1. Non-skill labour
- 2. Skill labour
- 3. Professional
- 4. illiterate
- 5. Others, please specify.....

1.4 Occupational status: What was/were your job(s) that you had spent most of your time in the past 20years? (Specify those worked more than 1year, and sequence from the majority to minority or describe in a period of time)

- 1.4.1
- 1.4.2
- 1.4.3
- 1.4.4
- 1.4.5

1.5 What is your main disease in this admission?

.....

1.6 How long did you suffer from this disease?

.....

1.7 Physical status

- 1.Body weightkg.
- 2.Estimated weight before appearance of the disease.....kg.
- 3.Height.....cm.

2. Working and sport information

2.1 In general, how often did you lift or carry the heavy objects?

1. Never 2. Seldom 3. Sometimes 4. Often 5. Always

If the answer is never, please skip to question number 2.10

2.2 When did you start lifting or carrying the heavy objects?

Age.....years

2.3 Do you lift or carry the heavy objects now?

1. Yes 2. No

If the answer in no2.3 is no, when did you stop lifting or carrying the heavy objects?

Age.....years

2.4 Before stop lifting or carrying the heavy object, how many hours/day did you spend for heavy objects lifting?

1. <1hour 2. 1 - <3hour 3. 3 - <5hour 4. 5 - <7hour 5. >7hour

2.5 Before stop lifting or carrying the heavy object, how many days/week did you spend for heavy objects lifting?

1. 1day/week 2. 2days/week 3.3days/week 4.4days/week
5. 5days/week 6. 6days/week 7. 7days/week

2.6 Please specify the weight of heavy objects that you lifted (by approximation)?

2.6.1kg

2.6.2kg

2.6.3kg

2.7 Before occurring of the diseases, how many hours/day did you spend for heavy objects lifting?

1. <1 hour 2. 1 - <3 hour 3. 3 - <5 hour 4. 5 - <7 hour 5. >7 hour

2.8 Before occurring of the diseases, how many days/week did you spend for heavy objects lifting?

1. 1 day/week 2. 2 days/week 3. 3 days/week 4. 4 days/week

5. 5 days/week 6. 6 days/week 7. 7 days/week

2.9 How many years did you spend for lifting or carrying heavy object?

1. <1 year 2. 1- <3 years 3. 3- <5 years 4. 5- <10 years 5. >10 years

2.10 Have you ever exercised?

1. Yes 2. No

If no, please skip to question number 3

2.11 If you have exercise, are you exercises now?

1. Yes 2. No

If the answer in no. 2.11 is no, when did you stop exercise?

Age.....years

2.12 What was/were your exercises or sports that you had spent most of your time in the past? (sequence from the majority to minority or describe in a period of time)

2.12.1year

2.12.2year

2.12.3year

3. Tobacco consumption

3.1 Have you ever smoked?

1. Yes 2. No

If no, please skip to question number 4.

3.2 If you have smoked, are you smoking now?

1. Yes

2. No

If you do not smoke at present, please skip to question number 3.4

3.3 If you are a current smoker, how often do you smoke?

1. Every day

2. Occasionally.....day/week

3.4 When did you start smoking?

Age.....years

3.5 If you are ex-smokers, how often and how many did you smoke in the past?

1. Every day

2. Occasionally.....day/week

3.Number/day

3.6 When did you quit smoking?

Age.....years

3.7 Please tell us the number of items you usually smoke per day before occurring of the diseases?

.....Number/day

4. Lower urinary outflow tract obstruction

4.1 Had you ever been performed prostatic or urethral surgery?

1. Yes

2. No

If yes, please specify which type of surgery.....

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Question	Not at all	Less than 1 time in 5	Less than half the time	About half the time	More than half the time	Almost always
4.2. During the last 6months or so, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5
4.3. During the last 6months or so, how often have you had to urinate again less than 2 hours after you finished urinating?	0	1	2	3	4	5
4.4. During the last 6months or so, how often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5
4.5. During the last 6months or so, how often have you found it difficult to postpone urination?	0	1	2	3	4	5
4.6. During the last 6months or so, how often have you had a weak urinary stream?	0	1	2	3	4	5
4.7. During the last 6months or so, how often have you had to push or strain to begin urination?	0	1	2	3	4	5
4.8. During the last 6months or so, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	None 0	1 time 1	2time 2	3 time 3	4 time 4	5 time 5

5. Chronic cough symptoms in the past 2years

5.1 Have you ever experienced the chronic cough symptoms?

1. Yes 2. No

If the answer in no, please skip to number 6

5.2 How long did you have the continuously coughing?

1. <1month 2. 1-3months 3. >3months

5.3 Have you ever used any bronchodilating agents?

1. Yes 2. No

If the answer in no, please skip to number 6

5.4 How often did you use this agent?

1. Everyday 2. 1-2time/week 3. 1-2time/month
 4. 1-2time/6month 5. 0-1time/year

6. Past history of constipation

6.1 How often did you use the laxative agents?

1. Never 2. <1time/month 3. 1-2time/month
 4. 1-2time/week 5. everyday

6.2 How many times in the week did you open your bowels?

1. >14times (>2times/day)
 2. 7-14times (1-2time/day)
 3. 4-6times
 4. 3times
 5. <3times

6.3 What was the most common characteristic of your stool?

1. Soft blobs with clear cut edges or a mushy stool
 2. Like a sausage of snake, smooth and soft
 3. Like a sausage of snake but with cracks on its surface
 4. Sausage shaped but lumpy

5. Separate hard lumps, like nuts

6.4 How often have you had to push or strain to open your bowel?

1. Never 2. Seldom 3. Sometimes 4. Often 5. Always

6.5 On the average, how many minutes did you use in each open your bowel?

1. <5mins 2. 5-10mins 3. 10-15mins 4. 15-20mins 5. >20mins

6.6 How often did you have painful symptom at your anus during passing stools?

1. Never 2. Seldom 3. Sometime 4. Often 5. Always

6.7 How did you classify your constipation symptoms?

1. No constipation 2. Mild 3. Moderate

4. Severe 5. Mostly severe

6.8 How often did you search for helping from the physicians?

1. Never 3. Sometime 5. Regularly

7. Past history of lower abdominal operation

7.1 Had you ever been performed lower abdominal operation?

1. Yes 2. No

If yes, please specify which type of surgery.....

7.2 Please showing the types of incision

Lower midline incision

Lower paramedian incision

Grid-iron incision

Transverse incision

Transverse suprapubic incision

Others, please specify.....

Appendix 5

แบบสอบถาม

1. ข้อมูลทั่วไป

1.1 สถานภาพสมรสในปัจจุบันของท่าน

1. โสด
2. คู่/สมรส
3. หย่าร้าง/แยกกันอยู่
4. ม่าย (คู่สมรสเสียชีวิต)

1.2 สถานภาพทางการศึกษาของท่าน

1. ไม่เคยได้เรียนหนังสือ
2. ประถมศึกษา
3. มัธยมศึกษา
4. ปวช. / ปวส. / อนุปริญญา
- 5.ปริญญาตรี หรือสูงกว่า

ประถม...ปี มัธยม...ปี

1.3 ปัจจุบันท่านประกอบอาชีพหลักอะไร (ระบุตำแหน่ง, ชนิดของงาน)

1. ผู้ใช้แรงงาน/รับจ้างทั่วไป
2. พนักงานบริษัท/ ห้างร้าน
3. รับราชการ/รัฐวิสาหกิจ
4. ธุรกิจส่วนตัว
5. วิชาชีพอิสระ
6. ไม่ได้ประกอบอาชีพ
7. อื่นๆ โปรดระบุ

1.4 อาชีพหลักของท่านในอดีตที่ผ่านมา (เรียงลำดับจากอดีตจนปัจจุบัน, รวมทั้งระยะเวลาที่ทำงานในแต่ละชนิด)

1.4.1ระยะเวลา.....ปี

1.4.2ระยะเวลา.....ปี

1.4.3ระยะเวลา.....ปี

1.1.4ระยะเวลา.....ปี

เริ่มทำงาน	เริ่มป่วย	ปัจจุบัน

อายุ....ปี	อายุ....ปี	

1.5 ท่านเข้ารับการรักษาในโรงพยาบาลครั้งนี้ด้วยโรคอะไร?

โรค.....

1.6 ท่านเจ็บป่วยด้วยโรคดังกล่าวมาตั้งแต่เมื่อไร?

เดือน.....พ.ศ.....

1.7 อาชีพลักษณะทางกายภาพของท่าน

1.7.1 น้ำหนักปัจจุบันกิโลกรัม

น้ำหนักก่อนที่จะเจ็บป่วยด้วยโรคดังกล่าวกิโลกรัม

1.7.2 ส่วนสูงเซนติเมตร

2. ข้อมูลการทำงานและการออกกำลังกาย

2.1 โดยทั่วไปแล้วในขณะที่ท่านทำงานประจำหรืองานอดิเรก ท่านต้องยกสิ่งของที่มีน้ำหนักมากหรือไม่

1. ไม่ได้ยกเลย 2. ยกบ้างเล็กน้อย 3. ยกบ้างปานกลาง

4. ยกเป็นส่วนใหญ่ 5. ยกเกือบตลอด

ถ้าท่านไม่ได้ยกของที่มีน้ำหนักมากเลย ให้ข้ามไปยังคำถามข้อที่ 2.10

2.2 ท่านเริ่มยกของที่มีน้ำหนักมากตั้งแต่ท่านมีอายุเท่าไร

อายุ.....ปี

2.3 ปัจจุบันท่านยังคงยกของที่มีน้ำหนักมากอยู่หรือไม่

1. ยังคงยกอยู่ 2. เลิกยกแล้ว

ถ้าท่านเลิกยกของหนักแล้ว, ท่านเลิกยกตอนที่ท่านมีอายุได้เท่าไร

อายุ.....ปี

2.4 ถ้าท่านเลิกยกของหนักแล้ว, ในอดีตท่านต้องยกของหนักเป็นระยะเวลากี่ชั่วโมงในวัน

1. <1 ชั่วโมง 2. 1 - <3 ชั่วโมง 3. 3 - <5 ชั่วโมง

4. 5 - <7 ชั่วโมง 5. >7 ชั่วโมง

2.5 ถ้าท่านเลิกยกของหนักแล้ว, ในอดีตท่านต้องยกของหนักเป็นระยะเวลากี่วันในหนึ่งสัปดาห์

1. 1วัน 2. 2วัน 3. 3วัน 4. 4วัน 5. 5วัน
 6. 6วัน 7. 7วัน

2.6 โปรดระบุของที่มีน้ำหนักมากที่ท่านเคยยกและประมาณน้ำหนักสิ่งของดังกล่าว

2.6.1 , กิโลกรัม

2.6.2 , กิโลกรัม

2.6.3 , กิโลกรัม

2.6.4 , กิโลกรัม

2.7 ในช่วงเวลา 6 เดือนก่อนที่ท่านจะเจ็บป่วยด้วยโรคดังกล่าวนั้น, ใน 1 วันท่านต้องยกของหนักเป็นระยะเวลากี่ชั่วโมง ชั่วโมง

1. <1 ชั่วโมง 2. 1 - <3 ชั่วโมง 3. 3 - <5 ชั่วโมง

4. 5 - <7 ชั่วโมง 5. >7 ชั่วโมง

2.8 ในช่วงเวลา 6 เดือนก่อนที่ท่านจะเจ็บป่วยด้วยโรคดังกล่าวนั้น, ใน 1 สัปดาห์ท่านต้องยกของหนักเป็นระยะเวลากี่วัน

1. 1วัน 2. 2วัน 3. 3วัน 4. 4วัน 5. 5วัน

6. 6วัน 7. 7วัน

2.9 ท่านยกของหนักมานานกี่ปี ปี

1. <1ปี 2. 1-3ปี 3. 3-5ปี 4. 5-10ปี 5. >10ปี

เริ่มยกของหนัก _____ เริ่มป่วย _____ ปัจจุบัน _____

อายุ....ปี

2.10 ท่านเคยออกกำลังกายหรือไม่

1. เคย 2. ไม่เคย

ถ้าไม่เคยให้ข้ามไปยังคำถามข้อที่ 3

2.11 ถ้าท่านเคยออกกำลังกาย, ขณะนี้ท่านยังออกกำลังกายอยู่ใช่หรือไม่

1. ใช่ 2. ไม่ใช่

ถ้าตอบไม่ใช่, ท่านหยุดการออกกำลังกายตอนที่ท่านอายุเท่าไร

อายุ.....ปี

2.12 ชนิดของการออกกำลังกายที่ท่านปฏิบัติมาในอดีต

2.12.1 , ระยะเวลา.....ปี

2.12.2 , ระยะเวลา.....ปี

2.12.3 , ระยะเวลา.....ปี

2.14 , ระยะเวลา.....ปี

เริ่มออกกำลังกาย เริ่มป่วย ปัจจุบัน

อายุ...ปี

3. ข้อมูลการสูบบุหรี่

3.1 ท่านเคยสูบบุหรี่หรือไม่

1. เคย

2. ไม่เคย

ถ้าตอบไม่เคย, ให้ข้ามไปตอบคำถามข้อที่4

3.2 ถ้าท่านเคยสูบบุหรี่, ปัจจุบันท่านยังสูบบุหรี่อยู่หรือเปล่า

1. สูบ

2. ไม่สูบ

3.3 ถ้าท่านยังคงสูบบุหรี่อยู่, ท่านสูบบ่อยแค่ไหน

1. ทุกวัน

2.วัน/สัปดาห์

3.4 ท่านเริ่มสูบบุหรี่ตั้งแต่อายุเท่าไร

อายุ.....ปี

3.5 ถ้าท่านเลิกสูบบุหรี่แล้ว, ที่ผ่านมามีท่านสูบหรี่บ่อยและมากแค่ไหน

1. ทุกวัน

2.วัน/สัปดาห์

3. จำนวน.....มวน/วัน

3.6 ท่านเลิกสูบบุหรี่เมื่อท่านอายุได้เท่าไร

อายุ.....ปี

3.7 ในระยะเวลา 6เดือนก่อนที่ท่านจะเจ็บป่วยครั้งนี้, ท่านสูบบุหรี่วันละกี่มวน

จำนวน..... มวน/วัน

เริ่มสูบบุหรี่ เริ่มป่วย ปัจจุบัน

อายุ...ปี

4. ประวัติทางเดินปัสสาวะส่วนล่างอุดตัน

4.1 ท่านเคยเข้ารับการรักษา หรือผ่าตัดโรคของต่อมลูกหมาก หรือท่อปัสสาวะหรือไม่ 1. เคยเมื่อท่านมีอายุ.....ปี 2. ไม่เคย

ถ้าเคย, โปรดระบุโรคและวิธีการผ่าตัด.....

ลักษณะการถ่ายปัสสาวะ	ไม่ มี อาการ เลย	น้อย บ้าง ครั้ง < 2 ครั้ง ต่อ การถ่าย 10 ครั้ง	ไม่บ่อย นัก < 5 ครั้ง ต่อ การถ่าย 10 ครั้ง	บ่อย บ้าง ครั้ง = 5 ครั้ง ต่อ การถ่าย 10 ครั้ง	บ่อยมาก > 5 ครั้ง ต่อการ ถ่าย 10 ครั้ง	บ่อยมาก ที่สุด เป็นเกือบ ทุกครั้ง
4.2 6เดือนก่อนที่ท่านจะเริ่มเจ็บป่วย ด้วยโรคนี้, ท่านมีอาการถ่ายปัสสาวะ ไม่สุดหรือรู้สึกว่ามีปัสสาวะเหลือค้าง บ่อยแค่ไหน	0	1	2	3	4	5
4.3 6เดือนก่อนที่ท่านจะเริ่มเจ็บป่วย ด้วยโรคนี้, ท่านถ่ายปัสสาวะแต่ละครั้ง ห่างกันไม่ถึง 2 ชั่วโมง บ่อยแค่ไหน	0	1	2	3	4	5
4.4 6เดือนก่อนที่ท่านจะเริ่มเจ็บป่วย ด้วยโรคนี้, ท่านถ่ายปัสสาวะกะปริบกะ ปรอย หรือถ่ายๆหยุดๆในการปัสสาวะ แต่ละครั้งบ่อยแค่ไหน	0	1	2	3	4	5
4.5 6เดือนก่อนที่ท่านจะเริ่มเจ็บป่วย ด้วยโรคนี้, เมื่อท่านมีอาการปวด ปัสสาวะแล้วกลับไม่อยู่บ่อยแค่ไหน	0	1	2	3	4	5
4.6 6เดือนก่อนที่ท่านจะเริ่มเจ็บป่วย ด้วยโรคนี้, ท่านรู้สึกว่าการปัสสาวะไม่พุ่ง แรงบ่อยแค่ไหน	0	1	2	3	4	5
4.7 6เดือนก่อนที่ท่านจะเริ่มเจ็บป่วย ด้วยโรคนี้, ท่านต้องเบ่งหรือรอนานกว่า จะปัสสาวะได้บ่อยแค่ไหน	0	1	2	3	4	5
4.8 6เดือนก่อนที่ท่านจะเริ่มเจ็บป่วย ด้วยโรคนี้, ท่านต้องลุกมาถ่ายปัสสาวะ	0 ครั้ง	1 ครั้ง	2 ครั้ง	3 ครั้ง	4 ครั้ง	5 ครั้ง
	0	1	2	3	4	5

ลักษณะการถ่ายปัสสาวะ	ไม่มีอาการเลย	นาน ๆ ครั้ง < 2 ครั้ง ต่อ การถ่าย 10 ครั้ง	ไม่บ่อย น้ ก < 5 ครั้ง ต่อ การถ่าย 10 ครั้ง	บ่อย ครั้ง = 5 ครั้ง ต่อ การถ่าย 10 ครั้ง	บ่อยมาก > 5 ครั้ง ต่อ การถ่าย 10 ครั้ง	บ่อยมาก ที่สุด เป็นเกือบ ทุกครั้ง
กี่ครั้งหลังเข้านอนจนถึงตื่นนอนตอนเช้า						

5. ประวัติการไอเรื้อรัง

5.1 ในระยะเวลา 2 ปีที่ผ่านมา, ท่านเคยมีอาการไอเรื้อรังติดต่อกันเป็นระยะเวลานานกว่า 2

สัปดาห์หรือไม่

1. เคย 2. ไม่เคย

ถ้าตอบไม่เคย, ให้ข้ามไปตอบคำถามข้อที่ 6

5.2 ท่านไอติดต่อกันเป็นระยะเวลานานเท่าใด

1. < 1 เดือน 2. 1- < 2 เดือน 3. 2- < 3 เดือน 4. 3- < 6 เดือน 5. > 6 เดือน

2.3 ท่านเคยใช้ยาขยายหลอดลมหรือไม่

1. เคย 2. ไม่เคย

ถ้าตอบไม่เคย, ให้ข้ามไปตอบคำถามข้อที่ 6

2.4 ท่านใช้บ่อยมากแค่ไหน

1. ไม่เคยใช้ 2. น้อยกว่าเดือนละครั้ง 3. เดือนละ 1-2 ครั้ง

4. สัปดาห์ละ 1-2 ครั้ง 5. ทุกวัน

6. ประวัติการถ่ายอุจจาระก่อนที่ท่านจะเจ็บป่วยครั้งนี้

6.1 ท่านทานยาระบายบ่อยมากแค่ไหน

1. ไม่เคยทาน 2. น้อยกว่าเดือนละครั้ง 3. เดือนละ 1-2 ครั้ง

4. สัปดาห์ละ 1-2 ครั้ง 5. ทุกวัน

ถ้าท่านทานยาระบาย, ท่านทานเพราะสาเหตุใด.....

6.2 ใน 1 สัปดาห์, ท่านถ่ายอุจจาระบ่อยมากแค่ไหน

1. > 14 ครั้ง (> 2 ครั้ง/วัน)

2. 7-14 ครั้ง (1-2 ครั้ง/วัน)

3. 4-6 ครั้ง (เกือบทุกวัน)

4. 3 ครั้ง (วันเว้นวัน)

5. < 3 ครั้ง

6.3 ส่วนใหญ่ของอุจจาระของท่านมีลักษณะอย่างไร

1. ก้อนนิ่มไม่เป็นลำ / เหลว / คล้ายซีโคลน
2. ลายาวอ่อน, นุ่ม
3. ลายาว มีรอยแตก, แยกในลำอุจจาระ
4. ลายาวแข็ง
5. ก้อนแข็งเป็นก้อนๆไม่เป็นลำ คล้ายซีแพะ หรือเม็ดถั่ว

6.4 บ่อยครั้งแค่ไหนที่ท่านต้องออกแรงเบ่งมากในการถ่ายอุจจาระ

1. ไม่ต้องเบ่งเลย 2. นานๆครั้ง 3. บางเวลา(ประมาณครึ่งหนึ่ง)
4. บ่อยครั้ง (มากกว่าครึ่ง) 5. ทุกครั้งหรือเกือบทุกครั้ง

6.5 โดยทั่วไปท่านใช้เวลาานเท่าไรในการถ่ายอุจจาระแต่ละครั้ง

1. <5นาที 2. 5-<10นาที 3. 10-<15นาที 4. 15-<20 นาที 5. >20นาที

6.6 บ่อยครั้งแค่ไหนที่ท่านมีอาการปวดบริเวณปากทวารหนักในขณะที่ถ่ายอุจจาระ

1. ไม่มีอาการเลย 2. นานๆครั้ง 3. บางเวลา(ประมาณครึ่งหนึ่ง)
4. บ่อยครั้ง (มากกว่าครึ่ง) 5. ทุกครั้งหรือเกือบทุกครั้ง

6.7 ท่านรู้สึกว่าเป็นโรคท้องผูกหรือไม่, ถ้าเป็นท่านคิดว่าเป็นมากแค่ไหน

1. ไม่เป็น 2. เล็กน้อย 3. ปานกลาง
4. มาก 5. มากที่สุด

6.8 บ่อยครั้งแค่ไหนที่ท่านไปพบแพทย์เนื่องจากมีอาการถ่ายอุจจาระลำบาก

1. ไม่เคยพบเลย 3. บางครั้ง 5. เป็นประจำ

7. ประวัติการผ่าตัดบริเวณท้องน้อยส่วนล่าง

7.1 ท่านเคยเข้ารับการผ่าตัดบริเวณช่องท้องส่วนล่างหรือไม่

1. เคย 2. ไม่เคย

ถ้าเคยช่วยระบุชนิดของโรคที่ท่านเข้ารับการผ่าตัด.....

.....

7.2 ระบุชนิดของแผลผ่าตัด



- 1.Lower midline incision
- 2.Lower paramedian incision
- 3.Grid-iron incision
- 4.Transverse incision
- 5.Transverse suprepubic incision
- 6.Others, please specify.....



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

VITAE

Mr. Anan Manomaipiboon was born on October 25th, 1964 in Bangkok, Thailand. He graduated his M.D. degree from Faculty of Medicine – Siriraj hospital, Mahidol University in 1988. In the year 1992, he was certified the Thai board of General Surgery from Thai Medical Council.

Since June 2001, he has been admitted in the Master degree Program of Health Development at Faculty of Medicine, Chulalongkorn University, as funded by Bangkok Metropolitan Administration. During this course, he had conducted a case-control study to determine the risk factors associated with inguinal hernia in adult male.

Presently, he has been working as the instructor in the Department of Surgery, Bangkok Metropolitan Administration Medical College and Vajira Hospital.



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