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ORIGINAL ARTICLES

ABSTRACTS

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Original Article

Lymphatic Ligation versus Conventional Axillary Lymph Node Dissection in Breast Cancer Patients: A Randomized Control Trial

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Abstract

Background and Objective: **Seroma was a common complication of breast cancer surgery. It is a source of significant morbidity that led to delay adjuvant treatment. The primary objective was to evaluate seroma formation in a comparison between the lymphatic ligation technique and conventional axillary lymph node dissection.The secondary objective was to evaluate the factors affecting seroma formation.**

Materials and Methods: **A randomized control trial was conducted between January 2014 and November 2017.Sixty eight consecutive patients underwent mastectomy with axillary lymph node dissection by one experienced surgeon. The patients were randomly assigned to Group1 (lymphatic ligation) (n=34) and Group 2 (conventional surgery) (n=35).**

Results: **18 patients developed seroma (26.09%) with 8 (23.53%) patients were in the lymphatic ligation group and 10(28.57%) patients were in the conventional group. No statistical significance was found in seroma formation ($p = 0.633$), drain duration ($p = 0.238$) or total drain volume ($p = 0.330$) between the two groups. Lymphatic ligation was statistically and significantly correlated with longer operative time ($p = 0.002$). Age, BMI, total drain volume and drain dislodgement were significant factors influencing seroma formation ($p = 0.005$, $p = 0.002$, $p = 0.008$, $p = 0.015$, respectively). Multivariate analysis showed age and BMI were significant factors influencing seroma formation ($p = 0.008$, $p = 0.025$, respectively).**

Conclusion: **The lymphatic ligation technique could not reduce the incidence of seroma formation. Age, BMI were the factors influencing seroma formation in the patients undergoing mastectomy with axillary lymph node dissection.**

Keywords: Breast cancer, axillary dissection, seroma, lymphatic ligation

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Introduction

Seroma is a common complication of breast cancer surgery occurring in 3-85 percent[1,2] of breast cancer patients after breast or axillary surgery. Seroma can also interfere with healing, increase morbidity and discomfort and lead to delayed adjuvant treatment.

Several surgical techniques have been reported to reduce seroma formation[3-8]. Khan S, et al.[4] reported low incidence of seroma and drain volume when harmonic scalpel was used. Harmonic scalpel dissection yields better outcomes compared to electrocautery. Flap coverage in dead space has shown a significant decrease in seroma formation[5,6]. Fibrin glue can reduce axillary lymphatic drainage but cannot reduce seroma formation[7]. Gong Y, et al.[8] reported axillary dissection by lymph vessel ligation and dead space closure as an effective approach to reducing the incidence of seroma formation.

The authors hypothesized that seroma was most likely to originate from lymph. The primary objective of this study was to evaluate seroma formation, drain duration and total drain volume compared between the lymphatic ligation technique and conventional axillary lymph node dissection in breast cancer patients. The secondary objective was to evaluate the factors affecting seroma formation.

Methods

A randomized control trial was conducted between January 2014 and November 2017. Ethical approval was granted by the Ethics Committee. All patients were scheduled for modified radical mastectomy or mastectomy with sentinel lymph node biopsy. Negative sentinel lymph node biopsy patients were excluded from the study. The inclusion and discontinuation criteria are shown in Table 1. Sample size was calculated from formula.

Informed consent was obtained from all eligible patients. The patients undergoing modified radical mastectomy were randomized preoperatively. Patients undergoing sentinel lymph node biopsies were randomized after positive pathologic reporting (using randomly ordered sealed envelopes). The patients were randomly assigned to either lymphatic ligation (Group 1) or conventional surgery (Group 2). All patients received antibiotic prophylaxis. After the pathologic reporting, axillary lymph node dissection was performed in the positive sentinel lymph node patients. Axillary dissection was done up to level 2 in all cases. In some patients, axillary dissection was done up to level 3 due to suspected level 3 of lymph node metastasis. In the lymphatic ligation group, blue stain lymphatic channels are identified and ligated, all of the tissues that had been connected from the axillary vein bundle to the specimen were ligated with No. 3-0 silk (Figure 1).

The thoracodorsal nerve, long thoracic nerve and some branches of the intercostobrachial nerve were identified and preserved. Electrocauterization was used to control bleeding. An active suction drain (Redivac Drain No. 10-12) was placed at the pectoralis

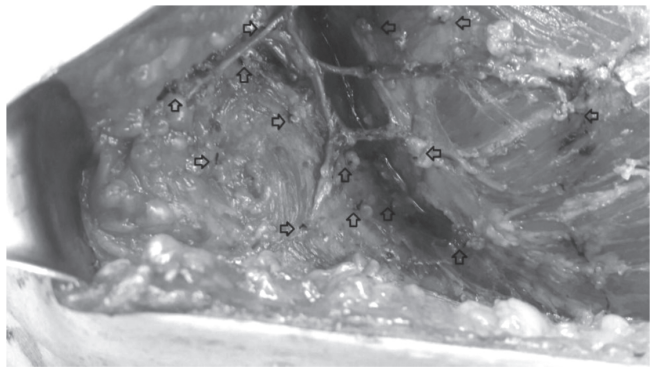

Figure 1 Axillary lymph node dissection by the lymphatic ligation technique (Arrow = ligation point)

Table 1 Shows the Inclusion and Discontinuation Criteria

Inclusion Criteria	Discontinuation Criteria
1. Breast cancer patients undergoing modified radical mastectomy	1. Major complication during surgery (accidental axillary vessel tearing, etc.)
2. Breast cancer patients undergoing mastectomy with sentinel lymph node biopsy	2. Refusal to continue in the study
3. Females older than 15 years	3. Incomplete data
	4. Loss during follow-up

muscle and in the axillary area (2 points). The drain was connected to a 600-ml suction bottle. The daily drain output was measured and recorded by the research team. The drain was removed when output was less than 30 ml for at least two consecutive days. The patients were discharged once at least one of the drains had been removed. The patients were instructed to monitor and observe the drain while they were at home. The daily drain output was recorded in a record sheet and the bottles were marked by the patients.The patients were scheduled for follow-up at one week after discharge and then weekly until the drain was removed. During the follow-up period, data collection was performed by the physician. Seroma was defined as a fluid collection by palpation on clinical examination. Needle aspiration was performed in patients with symptomatic seroma. All patients received adjuvant treatment if indicated by an oncologist. Follow-up appointments were made to monitor for early complications until three months after the operation.

Statistical Analysis

The studies were performed with STATA (Version 14) and data on characteristics were compared by using *t*-test. The Mann-Whitney U test was used to assess the statistically significant variances between the two groups. Chi-square and Fisher exact tests were applied to analyze the categorical variables. Logistic regression analysis was used to analyze the factors influencing seroma formation.

Results

A total of 87 patients with breast cancer were included; 19 patients with negative sentinel lymph node biopsies were excluded from the study, thereby leaving 68 consecutive patients undergoing mastectomy with axillary lymph node dissection by one experienced surgeon (50 modified radical mastectomy, 20 positive sentinel lymph node biopsy). There were two patients who had bilateral breast cancer had been treated on each side with the lymphatic ligation and conventional techniques. One patient was discontinued from the study due to accidental axillary vein tearing during the operation (Flow chart 1). The patients were randomly assigned to lymphatic ligation (n=34) and conventional surgery (n=35). No statistically significant differences were found between the two groups in terms of age,

Table 2 Demographic Data of the Patients

Data	Lymphatic ligation (n = 34)	Conventional (n = 35)	*p*-value
Age (years), mean (SD)	52.08 (11.58)	51.62 (10.70)	0.864
BMI* (kg/m^2), mean (SD)	22.89 (3.62)	22.94 (3.88)	0.953
Tumor size (cm), median (IQR)	4 (2.1, 6)	3 (2.5, 4.2)	0.258
Number of positive nodes, median (IQR)	2 (0, 8)	2 (1, 8)	0.917
Number of resected lymph nodes, median (IQR)	18.5 (15, 22)	17 (14, 20)	0.260
Neoadjuvant chemotherapy, n (%)	8 (23.53)	11 (31.43)	0.463
Operative time (min), mean (SD)	132.67 (19.28)	117.54 (19.68)	0.002
Blood loss (ml), median (IQR)	50 (30, 80)	40 (30, 55)	0.206
Drain dislodgement, n (%)	2 (5.88)	3 (8.57)	0.999
Total drain volume (10^2 ml), median (IQR)	7.85 (4.60, 16.38)	10.20 (6.60, 15.70)	0.330
Drain duration (days), median (IQR)	11 (7, 20)	15 (11, 19)	0.238
Seroma, n (%)	8 (23.53)	10 (28.57)	0.633
Complications, n (%)	4 (11.76)	3 (8.57)	0.710
Lymphedema	1 (2.94)	2 (5.71)	
Surgical site infection	1 (2.94)	0	
Wound dehiscence	1 (2.94)	0	
Superficial skin necrosis	0	1 (2.86)	
Dead during follow-up	1 (2.94)	0	

*BMI - body mass index

Flow chart 1 Flow Diagram of Participants

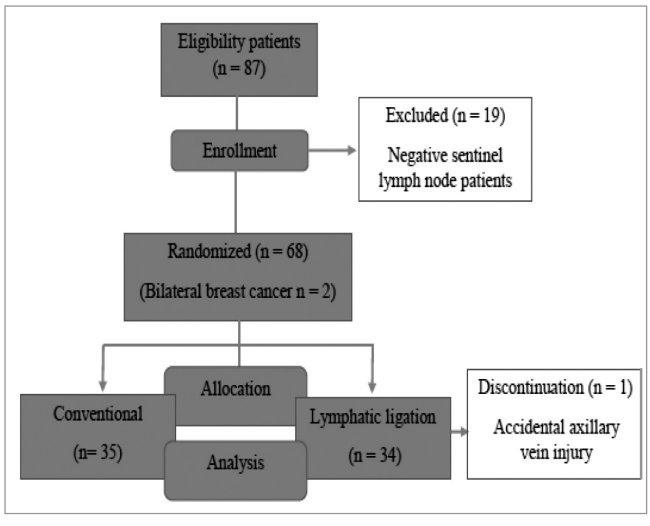

Figure 2

BMI, tumor size, number of positive nodes, number of resected lymph nodes, neoadjuvant chemotherapy, blood loss, drain dislodgement and complications. Longer operative time, however, showed statistically significant effects in lymphatic ligation (p = 0.002) (Table 2).

Seroma formation was developed in 18 (26.09%) operated breasts, including, 8 (23.53%) in the lymphatic ligation group and 10 (28.57%) in the conventional group (p = 0.633).

The drain duration in the lymphatic ligation group was lower than that of the conventional group (11 vs. 15 days), but with no statistically significant difference (p = 0.238). The total drain volume in the lymphatic ligation group was lower than that of the conventional group (785 vs. 1,020 ml), but with no

Table 3 Factors Affecting Seroma Formation

Data	Seroma (n=18)	Non-Seroma (n=51)	*p*-value	Univariate		Multivariate	
				OR (95%CI)	*p*-value	OR (95%CI)	*p*-value
Age (years), mean (SD)	58.00 (2.01)	49.68 (11.11)	0.005	1.079 (1.02-1.14)	0.010	1.087 (1.02-1.15)	0.008
Ligation technique, n (%)							
No	10 (55.56)	25 (49.02)	0.633	1			
Yes	8 (44.44)	26 (50.98)		0.769 (0.26-2.26)	0.634		
Conventional technique, n (%)							
No	8 (44.44)	26 (50.98)	0.633	1	0.634		
Yes	10 (55.56)	25 (49.02)		1.300 (0.44-3.82)			
BMI* (kg/m^2), mean(SD)	24.63 (3.43)	22.31 (3.67)	0.002	1.207 (1.02-1.42)	0.028	1.234 (1.02-1.48)	0.025
Tumor size (cm), median(IQR)	3.5 (2.5, 5.4)	3 (2.5, 5)	0.716	1.044 (0.85-1.27)	0.670		
Number of positive node, median (IQR)	2 (1, 11)	2 (1, 7)	0.430	1.035 (0.96-1.11)	0.340		
Number of resected lymph node, median (IQR)	17 (13, 20)	18 (15, 21)	0.435	0.972 (0.89-1.05)	0.482		
Neoadjuvant chemotherapy, n(%)							
No	15 (83.33)	35 (68.63)	0.230	1			
Yes	3 (16.67)	16 (31.37)		0.437 (0.11-1.72)	0.238		
Operative time (min), mean (SD)	127.88 (15.38)	123.98 (22.43)	0.496	1.009 (0.98-1.03)	0.491		
Blood loss (ml), median (IQR)	50 (30, 80)	50 (30, 60)	0.540	1.000 (0.99-1.00)	0.922		
Total drain volume (10^2 ml), median (IQR)	14.55 (7.50, 22.40)	7.60 (5.10,13.20)	0.008	1.088 (1.01-1.16)	0.015		
Drain duration (days), median (IQR)	16 (12, 21)	15 (7, 19)	0.055	1.059 (0.98-1.13)	0.098		
Drain dislodgement, n(%)							
No	14 (77.78)	50 (98.04)	0.015	1			
Yes	4 (22.22)	1 (1.96)		14.285 (1.47-138.28)	0.022		

*BMI - body mass index

statistically significant difference ($p = 0.330$). The operative time in the lymphatic ligation group was longer than that of the conventional group with statistical significance (132.67 vs. 117.54 min, $p = 0.002$). Complications occurred in 7 patients, including 3 cases of lymphedema, 1 surgical site infection, 1 wound dehiscence and 1 superficial skin necrosis. One patient developed severe sepsis and died within two months after the operation due to the complications of adjuvant chemotherapy.

According to the findings of this study, the ages of the patients in the seroma group were significantly higher than those of the non-seroma group (58 vs. 49.68 years, $p = 0.005$). The BMI values in the seroma group were significantly higher than those in the non-seroma group (24.63 vs. 22.31 kg/m^2, $p = 0.002$). Total drain volume in the seroma group was significantly higher than that of the non-seroma group (1,455 vs 760 ml, $p = 0.008$). In the group of patients who had drain dislodgement before their follow-up appointments, 80 percent developed seroma. It can be concluded, therefore, that drain dislodgement before follow-up appointment was one factor that significantly affected seroma formation ($p = 0.015$). Multivariate analysis showed age and BMI were significance factors influencing seroma formation ($p = 0.008$, $p = 0.025$ respectively) (Table 3).

Discussion

According to the findings, seroma can interfere with the healing process, prolong treatment, increase patient discomfort, and delay adjuvant treatment. Lymph leakage is also believed to be an important factor in seroma formation[9-12].

Hashemi E, et al.[13] found type of surgery to be a predicting factor for seroma formation in breast cancer patients. Seroma formation in the modified radical mastectomy group was higher than that of the breast conserving therapy group (39 vs. 23%, $p = 0.04$). These findings are comparable to those of the study of Gonzalez EA, et al,[14] who found seroma formation in a modified radical mastectomy group to be significantly higher than a breast conserving therapy group (19.9 vs. 9.2%, $p = 0.01$).

The randomized clinical study of Gong Y, et al.[8] showed that lymph vessel ligation and dead space closure could significantly reduce the incidence of seroma formation after modified radical mastectomy. Some studies have reported flap fixation aimed at reducing dead space to show a significant decrease in seroma formation[5,6] . The results of this study indicate that the lymphatic ligation technique was unable to reduce seroma formation when compared to conventional axillary lymph node dissection in breast cancer patients.

In assessing the severity of seroma, which is defined as Grade 1 if asymptomatic, Grade 2 if symptomatic (medical intervention or simple aspiration indicated) and Grade 3 if intervention radiology or operative intervention is indicated[6,15]. According to this definition, all seroma formations in this study were categorized as Grade 2. However, Grade 1 was occasionally underestimated as having no impact on clinical care.

The incidence of seroma formation in this study was 26.09 percent, which makes it comparable to other literature.[1,2] The primary outcome of this study shows that the lymphatic ligation technique could not reduce seroma formation, drain duration and total drain volume when compared to conventional axillary lymph node dissection in breast cancer patients. Although there were no differences in complications between the two groups, the operative time in the ligation group was significantly longer. Total drain volume and drain duration were lower in the ligation group, but the difference was not statistically significant. Small sample size might have been a limitation in this study.

The literature[5,6,7] supported the dead space closure technique (sutured subcutaneous skin to underlying muscle) in terms of its ability to reduce the incidence of seroma formation.

The secondary outcome in this study showed that age and BMI were key factors influencing seroma formation. In contrast, Woodworth PA, et al.[16] reported that age and BMI had no impact on seroma formation. Woodworth PA, et al. further reported that surgical drains that remained in place longer represented the only factor affecting seroma formation. However, the study of Woodworth PA, et al. was a retrospective review, and many studies have shown that high body weight and BMI are the factors influencing seroma formation[17-19]. Zielinski J, et al.[20] reported that patients older than 60 years or those with BMI exceeding 30 were key factors in seroma formation. Zielinski J, et al. asserted that obese people had larger surgical incisions,

which implies greater likelihood and higher numbers of lymphatic vessels potentially damaged.

Conclusions

The lymphatic ligation technique could not reduce the incidence of seroma, total drain volume and drain duration when compared to conventional axillary lymph node dissection in breast cancer patients. The complications were no different between the two groups. Operative time was significantly longer in the lymphatic ligation group. Age and BMI were important factors influencing seroma formation in breast cancer patients undergoing mastectomy with axillary lymph node dissection.

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บทคัดย่อ **การผ่าตัดเลาะต่อมน้ำเหลืองที่รักแร้โดยวิธีผูกหลอดน้ำเหลืองเทียบกับการผ่าตัดแบบดั้งเดิมในผู้ป่วยมะเร็งเต้านม**

นาวิน ขันธรักษา, พ.บ.

โรงพยาบาลสุรินทร์

วัตถุประสงค์: 1. ศึกษาอัตราการเกิดภาวะน้ำเหลืองคั่งภายหลังผ่าตัดเทียบระหว่างการผ่าตัดโดยวิธีผูกหลอดน้ำเหลืองกับการผ่าตัดเลาะต่อมน้ำเหลืองบริเวณรักแร้แบบดั้งเดิม 2. ศึกษาปัจจัยที่มีผลต่อการเกิดภาวะน้ำเหลืองคั่งภายหลังการผ่าตัด

วิธีการศึกษา: ทำการศึกษาแบบการทดลองแบบสุ่มและมีกลุ่มควบคุมตั้งแต่เดือนมกราคม 2557 ถึงเดือนพฤศจิกายน 2560 ผู้ป่วยมะเร็งเต้านมจำนวน 68 รายได้รับการผ่าตัดเต้านมร่วมกับผ่าตัดเลาะต่อมน้ำเหลืองบริเวณรักแร้โดยศัลยแพทย์ 1 คน โดยทำการเลือกผ่าตัดแบบสุ่ม จำแนกเป็นกลุ่มที่ 1 ผ่าตัดโดยวิธีผูกหลอดน้ำเหลือง จำนวน 34 ราย กลุ่มที่ 2 ผ่าตัดเลาะต่อมน้ำเหลืองแบบดั้งเดิมจำนวน 35 ราย

ผลการศึกษา: จากการศึกษาพบภาวะน้ำเหลืองคั่งภายหลังการผ่าตัดทั้งหมด 18 ราย (26.09%) โดย8 ราย (23.53%) เกิดในกลุ่มที่ทำการผ่าตัดโดยวิธีผูกหลอดน้ำเหลือง อีก10 ราย (28.57%) เกิดในกลุ่มที่ทำการผ่าตัดเลาะต่อมน้ำเหลืองแบบดั้งเดิม ซึ่งไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติ (p = 0.633) สำหรับระยะเวลาการใส่สายระบายและจำนวนของเหลวทั้งหมดจากสายระบายไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติเช่นกัน (p = 0.238, p = 0.330 ตามลำดับ) พบว่าระยะเวลาที่ใช้ในการผ่าตัดในกลุ่มทำการผ่าตัดโดยวิธีผูกหลอดน้ำเหลืองมากกว่าอย่างมีนัยสำคัญทางสถิติ (p = 0.002) การศึกษาพบว่า อายุ ค่าดัชนีมวลกาย จำนวนของเหลวทั้งหมดจากสายระบายและสายระบายหลุดก่อนกำหนดเป็นปัจจัยที่มีผลต่อการเกิดภาวะน้ำเหลืองคั่งภายหลังการผ่าตัด (p = 0.005, p = 0.002, p = 0.008, p = 0.015 ตามลำดับ) ซึ่งเมื่อใช้การวิเคราะห์หลายตัวแปรพบว่าอายุ ค่าดัชนีมวลกายเป็นปัจจัยที่มีผลต่อการเกิดภาวะน้ำเหลืองคั่งภายหลังการผ่าตัด (p = 0.008, p = 0.025 ตามลำดับ)

สรุป: การผ่าตัดเลาะต่อมน้ำเหลืองบริเวณรักแร้โดยวิธีผูกหลอดน้ำเหลืองไม่สามารถลดอัตราการเกิดภาวะน้ำเหลืองคั่งภายหลังการผ่าตัดเมื่อเทียบกับการผ่าตัดเลาะต่อมน้ำเหลืองแบบดั้งเดิม อายุ ค่าดัชนีมวลกายเป็นปัจจัยที่มีผลต่อการเกิดภาวะน้ำเหลืองคั่งภายหลังการผ่าตัดเต้านมร่วมกับการผ่าตัดเลาะต่อมน้ำเหลืองบริเวณรักแร้

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Original Article

A Study of Intraabdominal Pressure in Patients with Gastroschisis Before and After Closure of Abdominal Wall Defects

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Abstract

Background: **Ordinary treatments in patients with gastroschisis are primary and staged closure of abdominal wall defects (AWDs). The goal of treatment is to return the visceral organs into the abdominal cavity and minimize risks of increased intraabdominal pressure (IAP). Abdominal compartment syndrome (ACS) is the serious complication which induces to develop renal failure, bowel ischemia, respiratory compromise and death. IAP over 10 mmHg is defined as intraabdominal hypertension (IAH) and may induce to develop ACS.**

Purpose: **The aim of this study is to analyse IAP before and after closure of AWDs in patients with gastroschisis and investigate the factor affected increment of IAP.**

Materials and Methods: **The patients with gastroschisis who were treated at Queen Sirikit National Institute of Child Health from January 2017 to December 2017 were enrolled into the study. IAP was measured by using of urinary bladder pressure between before and after closure of AWDs in both primary and staged closure procedures. Demographic data, IAP and complications were collected in order to demonstrate the relationship by using statistical analysis with SPSS program. The level of p-value less than 0.5 was considered statistical significance.**

Results: **Twenty-six patients (15 males, 11 females) were enrolled in the study. The patients were treated by primary closure procedure in 3 cases and staged closure procedure in 23 cases. In the primary closure group, median IAP before treatment was 8.09 mmHg (range 4.41-8.09 mmHg), whereas median IAP after closure of AWDs was 10.3 mmHg (range 4.41-20.96 mmHg). In the staged closure group, median IAP before treatment was 5.88 mmHg (range 2.21-22.07 mmHg), whereas median IAP after closure of AWDs was 8.46 mmHg (range 2.94-22.07 mmHg). Of the total 26 patients, 8 cases (30.76%) had IAH after closure of AWDs with the IAPs ranging from 10.3 to 22.07 mmHg. Two of the 8 cases with IAH (7.69% of all the patients) cases developed ACS with acute respiratory insufficiency, one case in the primary closure group (IAP 20.96 mmHg) and the other one in the staged closure group (IAP 22.07 mmHg). Both cases were treated by endotracheal intubation and respiratory support until they recovered within 3 days. There was not statistically significant in comparing of IAP between primary and staged closure procedures in the periods of before and after closure of AWDs ($p > 0.05$). Demographic data, type of operative procedures and complications were not associated to high IAP (> 10 mmHg) in this study.**

Conclusion: **Comparison between primary and staged closure procedures, there was no statistically significant of IAP in patients with gastroschisis before and after closure of AWDs. However, approximately 8 % of the patients developed ACS immediately postoperative closure of AWDs. Demographic data, type of operative procedures and comorbidities were not statistically associated with IAH after closure of AWDs.**

Keywords: **Gastroschisis, intraabdominal pressure, intraabdominal hypertension, abdominal compartment syndrome, primary closure procedure, staged closure procedure**

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Introduction

Gastroschisis is the most common disease of congenital abdominal wall defect (AWD) in neonates with the incidence ranging from 1 : 2000 to 1 : 3000 livebirths[1,2]. This anomaly is associated with young maternal age. The etiology of gastroschisis is idiopathic. One theory suggests that gastroschisis results from failure of the mesoderm to form in the anterior abdominal wall, possible because of the relatively unsupported right side of the umbilicus as a result of resorption of the right umbilicalvein[3]. There is no membranous sac covering the herniated organs. The small and large intestines are the most common herniated viscera which are inflamed, swollen and matted loop appearance.

Gastroschisis requires surgical treatment in order to return the viscera into the abdominal cavity and close AWD with minimizing the risks of damage due to trauma or increased intraabdominal pressure (IAP). There are two most commonly used for the treatment options[4]. The first one is primary closure of AWD. The second one is staged closure procedure by placement of a silo, serial reduction of the herniated viscera and delayed closure of AWD[4].

Increased IAP may occur after closure of AWD. Intraabdominal hypertension (IAH) is called when the IAP is higher than normal limit. IAH reflects to develop abdominal compartment syndrome (ACS) which is the serious complication and induces to develop acute renal failure, bowel necrosis, respiratory compromise and death. In 2013, the World Society of Abdominal Compartment Syndrome (WSAC)[5] updated thatIAH in children is defined by a sustained and repeated pathological elevation in IAP over 10 mmHg and ACS in children is defined as a sustained elevation of IAP of greater than 10 mmHg associated with new or worsening organ dysfunction. IAP is approximated from either the bladder pressure or stomach pressure and can be used to guide the treatment. The reference standard for IAP measurement in children is introduced via the bladder by using 1 ml of saline / 1 kg as an instillation volume.

Many neonates with gastroschisis are transferred from the other hospital to treat at Queen Sirikit National Institute of Child Health (QSNICH), but no one mentioned about IAP for the treatment of gastroschisis in the previous studies of our institute[6-8]. Herein, we originate the research to study about this problem. The aim of this study was to analyse the IAP before and after closure of AWDs in our patients with gastroschisis and investigate the factors affected with increased IAP.

Materials and Methods

This study was a prospective pilot study of patients with gastroschisis who were treated at QSNICH from January 2017 to December 2017. The exclusion criteria is patients with urinary tract infection or unable to retain urethral catheter. Patients' data were collected including gender, gestational age, birth weight, size of AWD, eviscerated contents, intraoperative peak inspiratory pressure (PIP), IAP, operative procedures and comorbidities.

IAP was measured through the bladder pressure. This intravesical pressure measurement was performed under sterile technique by pediatric surgeons. Ordinarily, all of the patients with gastroschisis were retained urethral catheters. We used simple equipment which could be found in the ward and applied to measure IAP (Figure 1). Sterile normal saline solution (NSS) was instilled into the bladder via the urethral catheter in amount of 1 ml/1 kg with the minimum of 3 ml. The pubic symphysis was used as the reference of this method. The unit of IAP measured by NSS is cm H_2O. We want to use the unit of IAP in mmHg for comparison in the study and 1 cmH_2O is approximately 0.735 mmHg[9].

For the primary closure group, IAP was measured

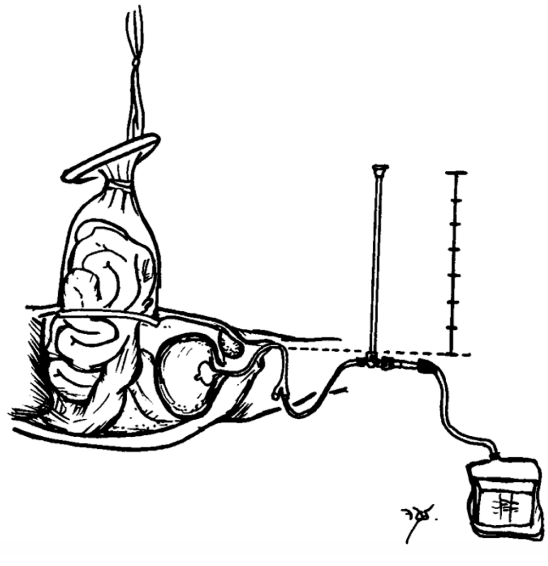

Figure 1 Diagram of intravesical pressure measurement

at the time of first admission (pretreatment period), immediate postoperation (Day 0) and 2 days after closure of AWD (Day 1 and Day 2). For the stage closure group, IAP was measured at the time of admission, and 2 days after placement of artificial sac or silo. IAP was recorded again before closure of AWD, immediate postoperation and 2 days after closure of AWD (Figure 2).

The collected data were analyzed by using SPSS(r) version 20 (IBM SPSS statistic). Demographic data were demonstrated by percentage, median, mean and standard variation. The Chi-square test and Pearson correlation were used to compare data in this study. A *p*-value less than 0.05 was considered statistically significant.

The study was approved by Ethic Committees of our institute. Document No. 59-081.

Results

A total of 29 patients with gastroschisis were treated at QSNICH during January 2017 to December 2017. Three cases were excluded due to unable retain urethral catheter. Therefore, 26 patients (15 males and 11 females) were enrolled in the study (Figure 3). Gestational age ranged from 30 to 36 weeks (median 36 weeks). Their birth weights ranged from 1,420 to 3,130 grams (median 2,090 grams). Premature and low birth weight neonates were noted in 18 cases (69.2%). Diameters of AWD ranged from 0.5 to 3.5 cm (median 2.5 cm).

The top 5 eviscerated contents were the small and large intestines, stomach, urinary bladder and uterus in 24 (92.3%), 19 (73.1%), 10 (38.5%), 7 (26.9%) and 5 cases (19.2%), respectively. The other eviscerated contents were gallbladder (4 cases), liver and testis (one case, each). Characteristics of gastroschisis were classified in antenatal (15 cases or 57.7%) and perinatal types (11 cases or 43.3%) based on the features of eviscerated contents. Fourteen cases had morbidities since birth including respiratory distress syndrome or RDS (7 cases), birth asphyxia (4 cases) and meconium aspiration syndrome (3 cases). Duration from birth until arrival at QSNICH ranged from 1.5 to 16 hours

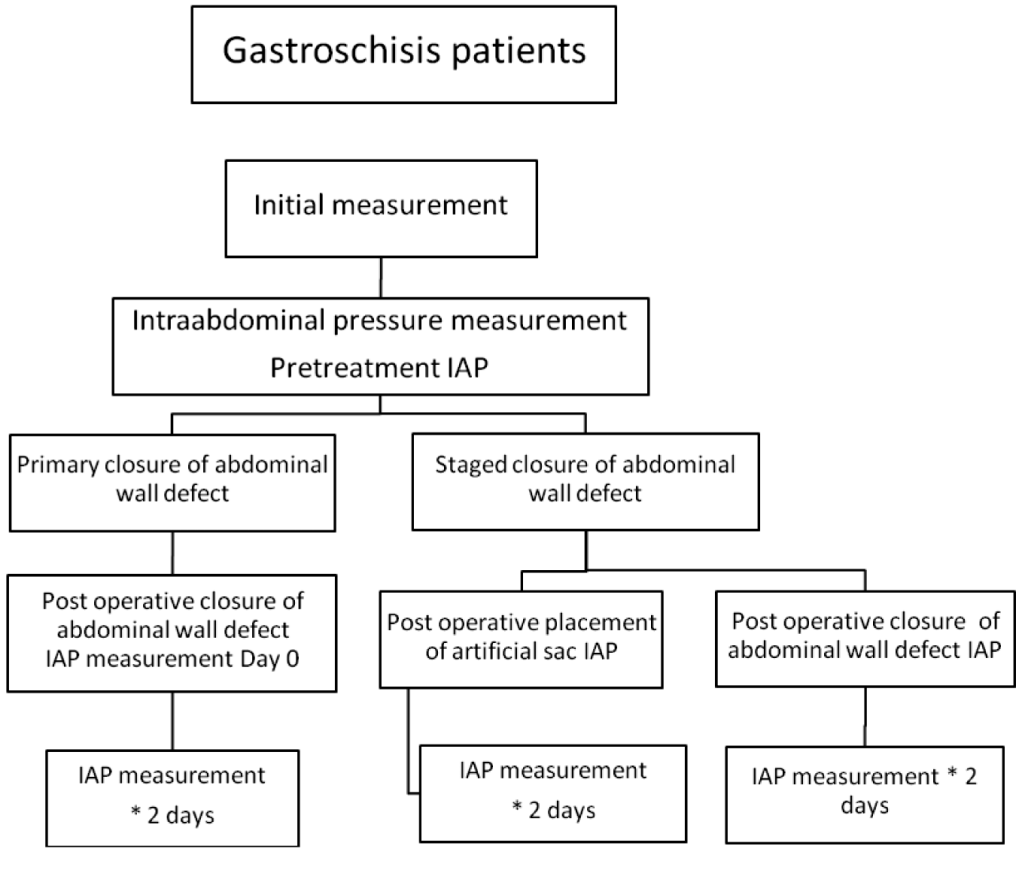

Figure 2 Algorithm of intraabdominal pressure measurement in this study

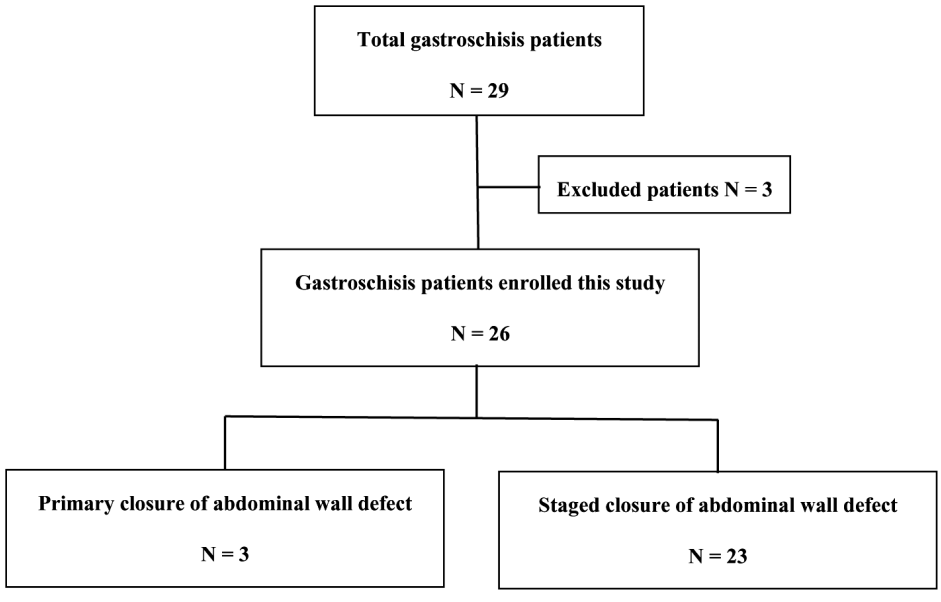

Figure 3 Schematic diagram of gastroschisis management

(median 7.5 hours).

Three cases (11.5%) were treated by primary closure procedure, while 23 cases (88.5%) were treated by staged closure of AWD. Demographic data of patients in two groups were not statistically different (Table 1).

In the primary closure group, median IAP at the pretreatment period was 6.25 mmHg, while IAPs after closure of AWDs at Day 0, 1 and 2 were 10.30, 6.62 and 7.36 mmHg, respectively (Figure 4). One case had mildly increased IAP (10.30 mmHg), another one developed ACS with respiratory distress, CO_2 retention and acidosis (IAP 20.96 mmHg) at immediate postoperation and was treated with ventilatory support, intravenous sedative (midazolam) and analgesic (fentanyl). IAPs of the 2 cases were decreased to normal level within the second postoperative day.

In the staged closure group, IAPs of various treatment periods were shown in Figure 5. Although most of the patients had IAPs within normal limit (≤10 mmHg), but 6 cases had increased IAP over 10 mmHg (IAH). IAPs of 5 cases were mildly elevated between 12.50 and 14.71 mmHg at immediate postoperative closure of AWDs without any symptoms and required closed observation only. The last one developed ACS with acute respiratory insufficiency (IAP 22.07 mmHg at immediate postoperation) and treated with ventilator support, intravenous midazolam and fentanyl. The IAP was decreased to normal limit in the third postoperative day.

IAPs of both groups in various periods of time were shown in Table 2. There was no statistical difference of IAPs between the primary and staged closure groups in all of the periods of pretreatment and postoperative closure of AWD (Day 0-2). Median pressure differences between the pretreatment and immediate postoperative treatment (Day 0) were 2.21 mmHg in the primary closure group and 5.00 mmHg in the staged closure group ($p = 0.99$).

Median PIP during intraoperative closure of AWD were 20 cmH_2O (range 18-24 cmH_2O) in the primary closure group and 18 cmH_2O (range 15-25 cmH_2O) in the staged closure group ($p = 0.28$).

Of the total 26 patients, 9 cases had endotracheal (ET) intubation after delivery due to RDS and continued ET intubation until postoperative closure of AWD. Another 5 cases were intubated after closure of AWD, 3 cases in the primary closure group and 2 cases in the staged closure group. The remainders 12 cases did not require postoperative ET intubation. Median IAPs at the periods of pretreatment and immediate postoperative closure of AWD of the 5 cases with ET-intubation were higher than those of the 12 non-intubate cases (7.50 vs 5.10; $p = 0.04$ and 13.46 vs 7.36; $p = 0.04$). Median duration of intubation in all of the 14 cases was 10 days (range 3-21 days).

The factors which associated to high IAP in the 26 patients were analysed. These factors included birth weight, gestational age, types of gastroschisis, size of

Table 1 Demographic data between primary and staged closure of abdominal wall defect group in patients with gastroschisis

Patient characteristic	Primary (N=3)	Staged (N=26)	*P*-value
Gestational age (weeks)			
Range	35-36	30-39	0.85
Median	36	36	
Mean ± SD	35.67 ± 0.5774	35.43 ± 2.0851	
Birth weight (grams)			
Range	2,000-2,600	1,420-3,130	0.54
Median	2,510	2,080	
Mean ± SD	2,370.00 ± 323.5738	2,199.22 ± 458.4364	
Male: Female (N, %)	3: 0 (100:0)	12: 11 (52:48)	0.18
Maternal age (year)			
Range	14-20	13-32	0.15
Median	15	19	
Mean ± SD	16.33 ± 3.2146	21.22 ± 5.4602	
Mode of delivery			
Normal delivery (N, %)	3 (100)	15 (65.2)	0.31
Cesarean section (N, %)	0 (0)	8 (34.8)	
Prenatal diagnosis (N, %)	1 (33.3)	8 (34.8)	
Type of gastroschisis			
Perinatal type (N, %)	1 (33.3)	10 (43.5)	0.62
Antenatal type (N, %)	2 (66.7)	13 (56.5)	

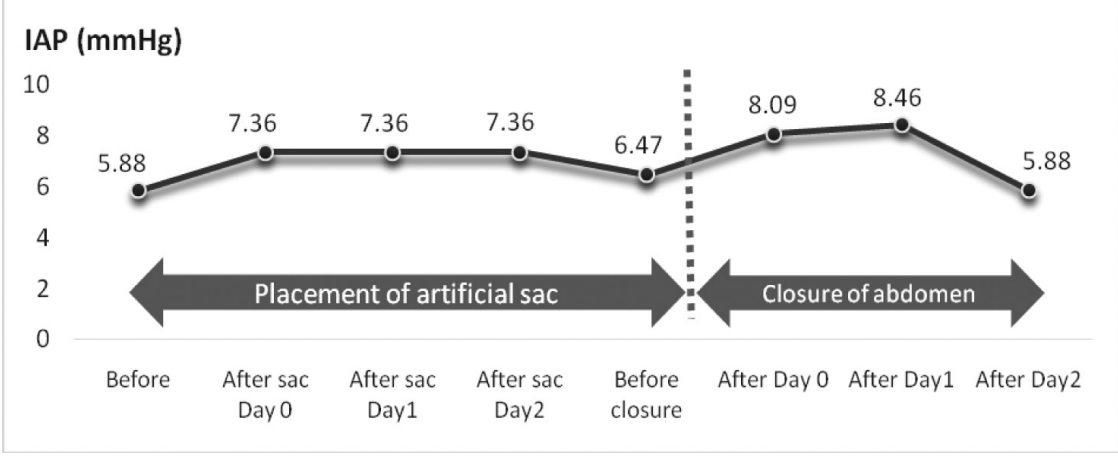

Figure 4 Linear graph of median intraabdominal pressure and range in primary closure of abdominal wall defect group (n=3)

AWD, eviscerated contents, preoperative and postoperative intubation, comorbidities, treatment procedure and intraoperative PIP. The level of IAP at 10 mmHg was used to analysed and revealed no any significant factor associated to high IAP.

DISCUSSION

Operative treatment of gastroschisis is primary and staged closure procedures. Increasing of IAP after closure of AWD of both techniques is the important issue. From the previous study of Lacey[10] in 1993, IAPs higher than 10-15 mmHg induced to have decreased renal and intestinal perfusion, and a silo or prosthetic patch might be needed. Ein[11] suggested that IAP higher than 20 mmHg could develop renal failure and bowel ischemia. Divarei[12] used the point at IAP 15 mmHg, the incidences of IAH and ACS in children were 9% and 4%. Whereas the incidence of IAH and ACS in gastroschisis patients were 1.33% and 0.67%,

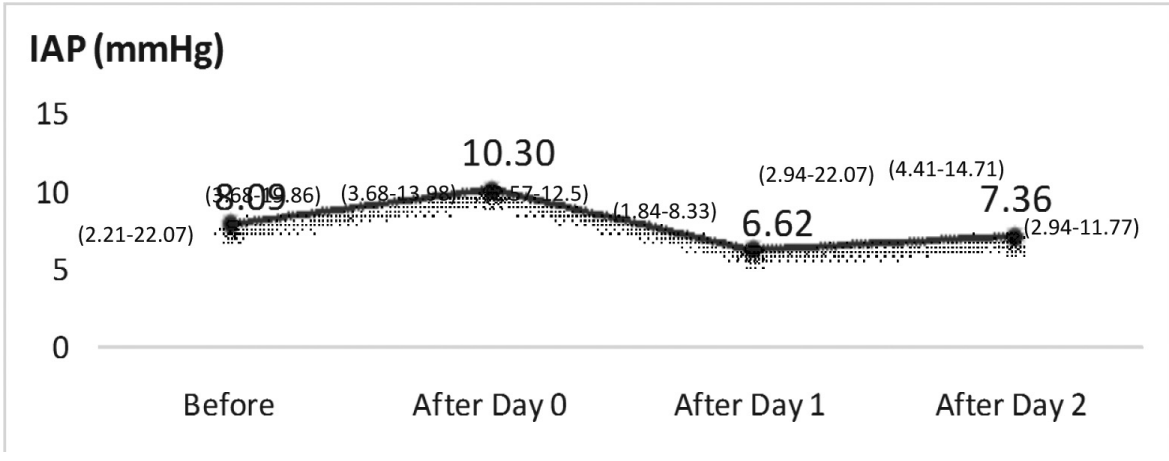

Figure 5 Linear graph of median intraabdominal pressure and range in staged closure of abdominal wall defect group (n=23)

Table 2 Comparison of intraabdominal pressure between primary and staged closure of abdominal wall defect group

Intraabdominal pressure (mmHg)	Primary closure group (N=3)	Staged closure group (N=23)	*P*-value
Pretreatment			
Range	4.41-8.09	2.21-22.07	0.95
Median	8.09	5.88	
Mean ± SD	6.87 ± 2.1233	6.72 ± 4.2482	
After closure of abdominalwall defect (Day 0)			
Range	4.41-20.96	2.94-22.07	0.36
Median	10.30	8.09	
Mean ± SD	11.89 ± 8.3893	9.16 ± 4.2060	
After closure of abdominalwall defect (Day 1)			
Range	5.88-8.09	4.41-14.71	0.26
Median	6.62	8.46	
Mean ± SD	6.87 ± 1.1236	8.58 ± 2.5088	
After closure of abdominalwall defect (Day 2)			
Range	4.78-11.03	2.94-11.77	0.61
Median	6.62	5.88	
Mean ± SD	7.48 ± 3.2133	6.61 ± 2.6533	
Pressure difference (postoperative Day 0 - pretreatment)			
Range	0 -12.87	1.10-11.77	0.99
Median	2.21	5	
Mean ± SD	5.02 ± 6.8838	5.02 ± 2.9088	

respectively[12].

From the WSACS5 in 2013, the Pediatric Guidelines Sub-committees updated the definition of normal level of IAP, IAH and ACS. Normal level of IAP in critically ill children was approximately 4-10 mmHg. The IAH in children was defined by a sustained or repeated pathological elevation in IAP over 10 mmHg. The ACS in children was defined as a sustained elevation in IAP of greater than 10 mmHg associated with new of greater than 10 mmHg associate with new or worsening organ dysfunction[5]. The most accuracy method of IAP study is intravesical pressure measurement using 1 ml of normal saline/kg[10,13,14]. In this study, we originally used cmH_2O as the unit of IAP and convert to mmHg for analysis and 1 cmH_2O is approximately 0.735 mmHg[9].

From the present study, mean pressure difference between immediate postoperative closure of AWD and

Table 3 Reviewed the previous and present studies regarding intraabdominal pressure using for treatment of gastroschisis

Investigators	Year Study design	Patients' data		IAP post AWD closure (mmHg)
		GA (weeks)	BW (grams)	
Lacey[10]	1933 experimental	mean 36 range 25-40	mean 2,461 rang 930-4,110	staged closure > 20
Olesevich[15]	2005 experimental	primary closure mean 37 range 36-38 staged closure mean 35 range 34-37.5	primary closure mean 2,500 range 2,200-2,800 staged closure mean 2,600 range 2,300-2,700	primary closure 16 staged closure 27
Schmidt[16]	2011 experimental	primary closure mean 35 range 37 staged closure mean 37	primary closure mean 2,154 range 2,237 staged closure mean 2,237	primary closure <15* staged closure > 15*
The present study	2018 Observational	mean 36 range 30-38	primary closure mean 2,370 range 2,000-2,600 staged closure mean 2,080 range 1,420-3,130	primary closure mean 6.87 range 4.41-20.96 staged closure mean 9.16 range 2.94-22.07

Abbreviation : GA = gestational age BW = birth weight IAP = intraabdominal pressure

* performed primary closure procedure if intraabdominal pressure at the pretreatment period under 20 cmH_2O (15 mmHg)

* * performed staged closure procedure if intraabdominal pressure at the pretreatment period over 20 cmH_2O (15 mmHg)

pretreatment period were 5.02 ± 6.88 mmHg in the primary closure group and 5.02 ± 2.91 mmHg in the staged closure group (Table 2). It seemed to be safe from the risk of IAH and ACS after closure of AWD. However, 8 cases (30.76% of all the patients) in both groups had increased IAP over 10 mmHg after closure of AWD. Six cases (23.07% of all the patients) mildly evaluated IAP ranging 10.30 to 14.71 mmHg without any abnormal symptoms. Two cases developed ACS (7.64 % of all the patients). One case in the primary closure group had increased IAP from 8.09 to 20.96 mmHg and the other one in the staged closure group had increased IAP from 10.30 to 22.07 mmHg. Both cases developed respiratory distress which required postoperative ET-intubation, mechanical ventilation, midazolam and fentanyl administration. They successfully treated until the IAP was returned to normal limit within 3 postoperative days.

Over the past three decades, many investigators studied about IAP in patients with gastroschisis. In 1993, Lacey10 used IAP at the level of 20 mmHg as aguideline for treatment including type of operative procedures, duration of staged closure procedure and also administration of analgesic, sedative or paralytic medications. In 2005, Olesevich[15] used IAP at the level of 20 mmHg for selection of the appropriated operative treatment. He advocated that primary closure was safely accomplished in 100% of neonates with gastroschisis whose bladder pressure measured 20 mmHg or less. Schmidt[16] studied the outcome after treatment by using IAP guide. He chose delayed primary closure if IAP below 20 cmH_2O (approximately 15 mmHg) and staged closure if IAP equal or higher than 20 cmH_2O. The results were no statistical difference between both groups of children. Table 3 revealed the previous and present studies about IAP in gastroschisis management. All of the previous studies used IAP as the guideline for selection of the appropriated operative procedure, but the present study was just observation of IAP between before and after closure of AWD and did not change the decision making of the surgeons in operative procedure. We found that IAP of our patients

was lower than the cut point of IAP using in the previous studies. Most of patients with gastroschisis at our institute tend to treat with staged closure procedure in order to reduce the risks of developing IAH and ACS. It is the limitation for comparative study of both procedures because of small amount of cases in the primary closure group. We hope to increase patients who will be treated by primary closure procedure and used IAP as the guideline in the future.

Conclusion

IAPs before and after closure of AWDs were not statistically different either primary and staged closure procedures. Approximately 23% of all the patients with gastroschisis had mild IAH without any symptoms and 8% of the patients developed ACS and required ventilator support, sedative and analgesia after closure of AWDs. Demographic data, type of operative procedures and complications were not statistically associated to IAH (> 10 mmHg) after closure of AWDs.

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บทคัดย่อ **การศึกษาความดันในช่องท้องของผู้ป่วย Gastroschisis ก่อนและหลังการเย็บปิดผนังหน้าท้อง**

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**กลุ่มงานศัลยศาสตร์ สถาบันสุขภาพเด็กแห่งชาติมหาราชินี กรุงเทพฯ*

ความเป็นมา: การรักษาผู้ป่วย Gastroschisis มี 2 วิธี คือ การผ่าตัดเย็บปิดผนังหน้าท้องในครั้งแรก และเย็บปิดแบบเป็นขั้นตอน โดยหลักการการรักษาที่สำคัญคือการนำส่วนของอวัยวะในช่องท้องที่ออกมากลับเข้าไปไว้ภายในช่องท้องโดยให้มีความเสี่ยงน้อยที่สุดต่อการเกิดภาวะความดันในช่องท้องสูง ภาวะความดันในช่องท้องสูงเป็นภาวะแทรกซ้อนที่สำคัญ ทำให้เกิดภาวะไตวาย ลำไส้ขาดเลือด ระบบหายใจล้มเหลว จนถึงเสียชีวิตได้

วัตถุประสงค์: เพื่อศึกษาค่าความดันในช่องท้องผู้ป่วย gastroschisis ก่อนและหลังผ่าตัดปิดผนังหน้าท้อง และหาปัจจัยที่มีผลต่อการเพิ่มความดันในช่องท้องของผู้ป่วย gastroschisis

วัสดุและวิธีการ: เป็นการศึกษาในผู้ป่วยเด็ก gastroschisis ที่มารับการรักษาในสถาบันสุขภาพเด็กแห่งชาติมหาราชินีตั้งแต่ 1 มกราคม 2560 ถึง 31 ธันวาคม 2560 ทั้งที่ได้รับการรักษาโดยวิธีผ่าตัดปิดผนังหน้าท้องแบบครั้งเดียวและแบบเป็นขั้นตอน โดยการวัดความดันในช่องท้องจะวัดผ่านสายสวนปัสสาวะทั้งก่อนและหลังผ่าตัดปิดผนังหน้าท้อง ข้อมูลที่ศึกษาได้แก่ ข้อมูลทั่วไปของผู้ป่วย ความดันในช่องท้อง และภาวะแทรกซ้อนที่เกิดขึ้น นำข้อมูลมาวิเคราะห์ทางสถิติด้วยโปรแกรม SPSS โดยกำหนดให้มีนัยสำคัญทางสถิติเมื่อ p-value น้อยกว่า 0.05

ผลการศึกษา: ผู้ป่วย 26 ราย (ชาย 15 ราย หญิง 11 ราย) ถูกนำเข้ามาในการศึกษาครั้งนี้ ผู้ป่วยที่รักษาโดยวิธีผ่าตัดเย็บปิดผนังหน้าท้องแบบครั้งเดียวมี 3 ราย ผู้ป่วยที่รักษาโดยเย็บปิดผนังหน้าท้องแบบขั้นตอน 23 ราย ในผู้ป่วยกลุ่มแรกค่ามัธยฐานของความดันในช่องท้องก่อนการรักษาเท่ากับ 8.09 มิลลิเมตรปรอท (พิสัย 4.40-8.09 มิลลิเมตรปรอท) ขณะที่ค่ามัธยฐานหลังผ่าตัดปิดหน้าท้องทันทีเท่ากับ 10.30 มิลลิเมตรปรอท (พิสัย 4.41-20.96 มิลลิเมตรปรอท) ในผู้ป่วยกลุ่มที่สองค่ามัธยฐานของความดันในช่องท้องก่อนการรักษาเท่ากับ 5.88 มิลลิเมตรปรอท (พิสัย 2.21-22.07 มิลลิเมตรปรอท) ขณะที่ค่ามัธยฐานหลังผ่าตัดปิดหน้าท้องทันที่เท่ากับ 8.46 มิลลิเมตรปรอท (พิสัย 2.94-22.07 มิลลิเมตรปรอท) ในจำนวนผู้ป่วยทั้งหมด 26 ราย มีอยู่ 8 ราย (ร้อยละ 30.76) มีค่ามัธยฐานของความดันในช่องท้องสูงกว่าปกติ สูงตั้งแต่ 10.30 ถึง 22.07 มิลลิเมตรปรอท มีผู้ป่วย 2 ใน 8 ราย ที่มีความดันในช่องท้องสูงหลังผ่าตัดเย็บปิดช่องท้อง (ร้อยละ 8 ของผู้ป่วยทั้งหมด) เกิดภาวะ abdominal compartment syndrome หนึ่งรายเป็นผู้ป่วยที่ผ่าตัดโดยวิธีแรก (ความดันในช่องท้องสูง 20.96 มิลลิเมตรปรอท) และอีกหนึ่งรายเป็นผู้ป่วยที่ผ่าตัดปิดช่องท้องโดยวิธีที่สอง (ความดันในช่องท้องสูง 22.07 มิลลิเมตรปรอท) ผู้ป่วยทั้งสองรายนี้ ได้รับการรักษาโดยการใส่เครื่องช่วยหายใจ ได้รับยาฉีด midazolam และ fentanyl ทางหลอดเลือดดำ และความดันในช่องท้องกลับมาเป็นปกติภายในเวลา 3 วันหลังผ่าตัดปิดช่องท้อง ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติในการเปรียบเทียบความดันในช่องท้องระหว่างการผ่าตัดปิดผนังหน้าท้องแบบครั้งเดียวและการผ่าตัดเย็บปิดผนังหน้าท้องแบบเป็นขั้นตอนทั้งก่อนและหลังการเย็บปิดผนังหน้าท้อง ($p > 0.05$) ข้อมูลทั่วไปวิธีการผ่าตัดเย็บปิดผนังหน้าท้องและภาวะแทรกซ้อน ไม่มีความสัมพันธ์กับการทำให้เกิดความดันสูงในช่องท้อง (มากกว่า 10 มิลลิเมตรปรอท) ในการศึกษาครั้งนี้

สรุป: เปรียบเทียบระหว่างการผ่าตัดเย็บปิดผนังหน้าท้องแบบขั้นตอนเดียว และการผ่าตัดปิดผนังหน้าท้องแบบเป็นขั้นตอน ไม่มีความแตกต่างอย่างมีนัยสำคัญของความดันในช่องท้อง ทั้งก่อนและหลังผ่าตัดปิดผนังหน้าท้อง อย่างไรก็ตาม ประมาณร้อยละ 8 ของผู้ป่วยทั้งหมดเกิดความดันในช่องท้องสูงจนกลายเป็น abdominal compartment syndrome ทันทีหลังผ่าตัดปิดผนังหน้าท้อง ข้อมูลพื้นฐานชนิดของการผ่าตัดปิดผนังหน้าท้องและภาวะแทรกซ้อนไม่มีสัมพันธ์ทางสถิติกับการเกิดความดันสูงในช่องท้อง ภายหลังผ่าตัดปิดผนังหน้าท้อง

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Original Article

The Effects of Hypoalbuminemia at Admission on Adverse Outcomes in a Tertiary University Based General Surgical Intensive Care Units

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Abstract

Background: **Although albumin is the marker of nutrition status but the albumin level usually low on acute illness and its level on outcome is controversy. The objective of this study was to determine the effect of serum albumin which on morbidity and mortality in hospitalized surgical patients admitted to general surgical intensive care unit (SICU).**

Method: **We performed an ambispective cohort study between 2011-2013. All patients who admitted to SICU were enrolled to this observation. The albumin level, severity of disease, type of surgery and demographic data were collected on the SICU admission. The outcomes included the length of mechanical ventilator day, hospital and SICU stay, lung complication, septicemia, urine infection, acute kidney injury, surgical site infection, new-onset upper gastrointestinal hemorrhage, delirium, seizure, myocardial infarction and mortality were recorded at patient discharge. We categorized the patient into two group based on admission albumin level as normal group (≥ 3.5 g/dL) and hypoalbuminemia group (< 3.5 g/dL)**

Results: **A total of 893 patients were enrolled and analyzed in this study. Of these, the normal and hypoalbuminemia group were 106 (11.9%) and 787 (88.1%) respectively. After adjusted the adverse outcomes by multivariable analysis, the hypoalbuminemia group had significant higher risk of infective complication [Odds ratio (95% confidence interval): 2.68 (1.35 - 5.30); $p = 0.005$] especially on pulmonary infection [2.08 (1.01 - 4.27); $p = 0.046$], acute kidney injury [4.06 (1.44 - 11.47), $p = 0.008$], and mortality [5.92 (2.12 - 16.54); $p = 0.001$]**

Conclusion: **The incidence of hypoalbuminemia is common in SICU. The hypoalbuminemia patients increase risk of infective complication especially pulmonary infection, acute kidney injury, and mortality.**

Keywords: **Hypoalbuminemia, surgical intensive care unit, mortality, infection, acute kidney injury**

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Introduction

The serum albumin is the majority of protein in human plasma and it is produced by liver. Serum albumin play an important role on physiologic function including regulating blood volume via maintaining the oncotic pressure (colloid osmotic pressure) of the blood compartment, acid base buffering as well as free radical scavenger. In addition, it also has the low water solubility molecules carrying property, such as lipid soluble hormones, bile salts, unconjugated bilirubin, free fatty acids, trace elements (e.g. calcium, iron), and many type of drugs. They also control acid-base balance and having the action like antioxidant[1,2]. Although the morbidity and mortality in intensive care patient could be predicted by severity scoring system such as APACHE II score, SAPS score, and SOFA score. The albumin were no accounting for the variable on these scoring system[3]. These might be arisen from the controversial data. Rady et al reported that the preoperative hypoalbuminemia can predict outcome of cardiovascular patient. Although the incidence of hypoalbuminemia was about < 50%, the cardiac patient undergoing cardiovascular surgery had higher likelihood of postoperative infections, prolong mechanical ventilator day and death[4]. However, Law et al reported the opposite direction of results. They found that the causes of death did not associated with serum albumin level[5]. This evidence was confirmed by the results of Behrouz et al which studying on the subarachnoid hemorrhage patients. The study showed that hypoalbuminemia was also not the predictive factor for hospital mortality[6] . The controversial of this predictive factor, therefore, the objective of this study was to determine the effects of hypoalbuminemia on admission on adverse outcomes which occurred in general surgical intensive care unit (SICU).

Materials and methods

We performed an ambispective cohort study, between 2011 and 2013. All patients who were admitted to general SICU of Maharaj Nakorn Chiang Mai Hospital, Faculty of Medicine, Chiang Mai University on these periods were included. We excluded the patients who no document of admission albumin level, short stay in SICU, moribund patient, and the patient who could not be collected the final outcomes from the study (Figure 1). At admission date, we recorded the baseline of patient characters including albumin level, age, gender, diseases and types of surgery, and severity score using acute physiologic and chronic health evaluation II (APACHE II score). During SICU admission, we collected the adverse outcomes infective complications, acute kidney injury, surgical site infection, upper gastrointestinal hemorrhage, new-onset seizure, delirium, myocardial infarction, and mortality. We also recorded the length of mechanical ventilator usage, SICU and hospital length of stay. The Ethic Committee of Faculty of Medicine, Chiang Mai University was approved this study (Research ID: 1186/ Study code SUR-12-1186-EX).

We categorized the admission albumin into 2 group based on the previous study by Rady et al[4], the normal group was defined as admission albumin more

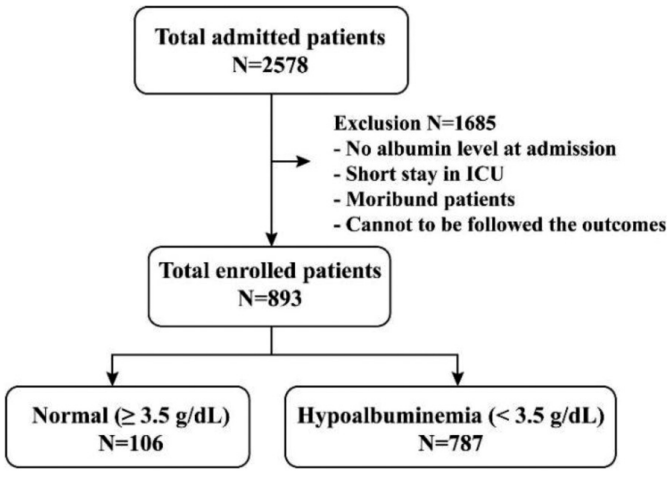

Figure 1 Study flow

than or equal 3.5 g/dl and albumin level less than 3.5 g/dl was defined as hypoalbuminemia group. All the analytic data were analyzed by STATA® version 12.0 software. The continuous variables were reported as mean and standard deviation (SD) or median and interquartile range (IQR) depended on their distribution. The categorical data were reported as number of occurrence and percentage. The difference between groups was analyzed by Chi-square, Mann-Whitney U test and student t test which depended on the type of data. The final adjusted predictive models were analyzed with multivariable regression analysis. The adjusted variables were selected on the difference of baseline characters and reported as coefficient or odds ratio (OR) with 95 percent confidence interval (95%CI) depended on the type of dependence variables. The *p* value less than 0.05 was statistically significant.

Results

During 36 months between 2011 and 2013, a total admitted patients were 2578. We excluded a total number of 1685 patients due to no admission albumin report, short stay in SICU, moribund patients, and cannot to be followed the final results. The total of 893 patients were enrolled and analyzed. The normal value of albumin was found in 106 (11.9%) patients. The hypoalbuminemia at admission in SICU was 787 (88.1%) patients. (Figure 1)

Regarding the demographic data (Table 1), female was the predominant gender on both group and no significant difference. The median age (IQR) of hypoalbuminemia was 62 (52 - 75) years and no difference with normal group. Although there was no statistical significant difference between groups in term of type of disease and type of surgery. The hypoalbuminemia group had a higher proportion in liver diseases when they were compared with normal group [hypoalbuminemia (22.2%) vs. normal (9.4%)]. In contrast, the hypoalbuminemia group had lower proportion in vascular diseases [hypoalbuminemia (17.6%) vs. normal (27.4%)]. Interestingly, the severity score measured by APACHE II score had a significant higher score in hypoalbuminemia [median/IQR: hypoalbuminemia (10/ 7-15) vs. normal (13/9-18); $p < 0.01$]. Therefore, the type of diseases and APACHE II score were the two adjusted variables which were integrated in the multiple regression model.

As Table 2, the univariable analysis demonstrated that hypoalbuminemia had significant longer mechanical ventilator day ($p = 0.014$), hospital length of stay ($p = 0.006$), and SICU length of stay ($p = 0.040$). In addition, hypoalbuminemia increased the

Table 1 Baseline patient characters

Patient characters	Normal* n=106	Hypoalbuminemia** n=787	*P*-value
Gender (Male: Female)	39:67	288:499	0.968
Age [Median (IQR)]	61.5 (46-72)	62 (52-75)	0.110
Type of disease			0.053
Gastro-intestinal	36 (33.96)	243 (30.96)	
Hepato-biliary-pancreas	10 (9.43)	174 (22.17)	
Vascular	29 (27.36)	138 (17.58)	
Trauma	6 (5.66)	35 (4.46)	
Thoracic (non cardiac)	15 (14.15)	110 (14.01)	
Skin and soft tissue	3 (2.83)	23 (2.93)	
Urological	7 (6.60)	53 (6.75)	
Head-neck-breast	0 (0.00)	9 (1.15)	
Type of surgery			0.219
Curative surgery	87 (82.08)	584 (74.49)	
Palliative surgery	6 (5.66)	54 (6.89)	
Without surgical procedure	13 (12.26)	146 (18.62)	
APACHE II score [Median (IQR)]	10 (7-15)	13 (9-18)	< 0.001

Note: *Normal is admission albumin ≥ 3.5 g/dL; **Hypoalbuminemia is admission < 3.5 g/dL

proportion of pulmonary infection ($p = 0.005$) and any infection ($p < 0.001$). They also increased risk of acute kidney injury ($p < 0.001$), myocardial infarction (p = 0.048) and mortality ($p < 0.001$)

Regarding the adjusted value by type of diseases and severity score (APACHE II score) using multivariable analysis model (Table 3), we found that there was statistical significant increase risk of following outcomes including infective complication [OR (95%CI): 2.68 (1.35 - 5.30); $p = 0.05$] especially on the pulmonary infective complication [2.08 (1.01 - 4.27); $p = 0.046$], acute kidney injury [4.06 (1.44 - 11.47); $p = 0.008$], and mortality [5.92 (2.12 - 16.54); $p = 0.01$]. Although the myocardial infarction had significant difference in univariable analysis but we could not analyze on multivariable analysis because there was no occurrence of event in the normal group (Table 2). There was statistical significant difference both of SICU and hospital length of stay between groups in univariable analysis model, but only hospital length of stay had a tendency risk of longer occupation rate in hypoalbuminemia patient in multivariable analysis ($p = 0.088$) (Table 3).

Table 2 Adverse outcomes

Adverse events	Normal n=106	Hypoalbuminemia n=787	*P*-value
Mechanical ventilator day [Median (IQR)]	0.5(0-3)	1(0-4)	0.014
Hospital length of stay [Median (IQR)]	14(9-20)	17(10-28)	0.006
SICU length of stay [Median (IQR)]	3(2-6)	4(3-7)	0.040
Infective complications (%)			
Pulmonary infection	9(8.49)	156(19.82)	0.005
Blood stream	3(2.83)	56(7.12)	0.095
Urinary	5(4.72)	62(7.88)	0.246
Any infection(s)	10(9.43)	207(26.30)	<0.001
Acute kidney injury (%)	4(3.77)	152(19.31)	<0.001
Surgical site infection (%)	3(2.83)	34(4.32)	0.470
Myocardial infarction (%)	0(0.00)	28(3.56)	0.048
Upper gastrointestinal hemorrhage (%)	0(0.00)	21(2.67)	0.089
New-onset stroke (%)	0(0.00)	2(0.25)	0.603
New onset seizure (%)	1(0.95)	11(1.40)	0.710
Delirium (%)	4(3.77)	65(8.26)	0.104
Mortality (%)	4(3.77)	189(24.02)	<0.001

Note: *Normal is admission albumin ≥ 3.5 g/dL; **Hypoalbuminemia is admission < 3.5 g/dL

Table 3 Multivariable analysis of adverse outcomes

Adverse events	Value	Effect size (95% CI)*	*P*-value
Mechanical ventilator day	Coefficient	0.001 (-0.0006 to 0.0027)	0.223
Hospital length of stay	Coefficient	0.001 (-0.0001 to 0.0019)	0.088
ICU length of stay	Coefficient	0.001 (-0.0007 to 0.0027)	0.246
Infective complications			
Pulmonary infection	Odds ratio	2.08 (1.01 - 4.27)	0.046
Blood stream	Odds ratio	1.88 (0.57 - 6.22)	0.300
Urinary	Odds ratio	1.35 (0.52 - 3.50)	0.532
Any infection (s)	Odds ratio	2.68 (1.35 - 5.30)	0.005
Acute kidney injury	Odds ratio	4.06 (1.44 - 11.47)	0.008
Mortality	Odds ratio	5.92 (2.12 - 16.54)	0.001

Abbreviation: 95%CI, 95% confidence interval

* The effect size was adjusted by type of diseases and severity score (APACHE II)

Discussion

The albumin is a complex large protein in human body with molecular weigh between 65 and 70 kilo Dalton[7]. It is synthesized by liver around 9 - 14 g/day in adult and the half-life is 18 - 21 days on normal situation[8]. Currently, circulation albumin has many physiologic function in both healthy and illness including binding and transport of drugs and substances, maintenance of colloid osmotic pressure, free radical scavenger, platelet and thrombotic activity, and vascular permeability effects[7-9]. However, the acute critically ill patient has the potential risk of low serum albumin level by many mechanisms such as resuscitative dilution, interstitial leakage, increase of degradation, and decrease of production[8]. Although a total 65 percent of admitted patients were excluded, the enrolled patient had incidence of hypoalbuminemia as high as 88.1 percent in our study.

Many of previous study showed that hypoalbuminemia increased risk of complications[4,10]. In one meta-analysis, the decreasing serum albumin concentration level on each 1 g/dl significant raised the odds of mortality by 137 percent and morbidity by 89 percent.[10] Our results of study were confirmed of these results that the hypoalbuminemia both of mortality, infective complications, and acute kidney injury. However, the previous results of preoperative hypoalbuminemia increased the likelihood of postoperative prolonged mechanical ventilation,[4] as well as in a meta-analysis of cohort and controlled study demonstrated that each 1 g/dl of decreasing of albumin level increase of ICU and hospital stay by 28 and 71 percent respectively[10], but our results showed no significant effects on these outcomes in multivariable analysis.

The cut off points for defining hypoalbuminemia are difference in range between 3.0 and 3.6 g/dl[4,10,11]. The complication is decreased during the albumin level exceeds 3 g/dl in a meta-analysis.[10] In our study, we select the categorized level at 3.5 g/dl. This level based on the previous report by Rady et al which followed cardiovascular surgical patients. The preoperative albumin level less than 3.5 g/dl increased risk of post-operative organ dysfunction, gastrointestinal hemorrhage, nosocomial infections, length of mechanical day, hospital stay, and ICU stay[4]. In addition, the recent report in elderly trauma patients by Garwe et al, they defined the hypoalbuminemia by emergency department albumin level less than 3.6 g/dl. At this level, the hypoalbuminemia was associated with a 2-fold increase in the risk of 30 day overall hospital complication.[11] Although we categorized the level of hypoalbuminemia higher than the general definition that determine as serum albumin concentration ≥ 3.0 g/dl, but the results of cutoff level in our study showed the unfavorable outcomes both mortality and some morbidity in SICU.

The strength of this study was the large cohort SICU patients that showed the high risk of adverse outcomes in patients who were hypoalbuminemia at admission. However, there were some inevitable limitation in this study. First, the excluded patients were high account for 65 percent of admission patient. However, most of these patients had the extreme prognosis (extreme risk or very low risk of mortality) which might not get the benefit of SICU care and deviate the results. Second, we did not collect the albumin containing fluid treatment during SICU admission in this study. The previous randomized control trial comparison of albumin and saline for resuscitation in ICU (SAFE study) showed no difference of mortality between groups except there were might be benefit in subgroup patient who diagnosed of sepsis[12]. Regarding the hypoalbuminemia in sepsis patients, the ALBIOS study protocol replaced the albumin to severe sepsis and septic shock patient until the concentration more than 3.5 g/dl. Even though the primary outcome of 90 days mortality was not different, but the albumin group had significant of higher mean arterial pressure and lower net fluid balance[13]. The fluid accumulation is one of the predictor of adverse outcomes in ICU. The previous study of fluid accumulation in general SICU demonstrated that threshold of fluid accumulation more than 5 percent of admitted body weight had greater risk of adverse outcome[14]. Of these evidences, the less of fluid accumulation might result in less ICU complications. Although there were many limitations of this cohort, the results of study implied that the hypoalbuminemia patients should be closely monitored and caution. The hypoalbuminemia might be a severity marker that led to the surgeon more early some intervention such as nutrition therapy as well as to choose the appropriate fluid therapy to the critically ill surgical patient.

Conclusion

The incidence of hypoalbuminemia is common in SICU. The hypoalbuminemia patients increase risk of infective complication especially pulmonary infection, acute kidney injury, and mortality.

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บทคัดย่อ **ผลของภาวะอัลบูมินในเลือดต่ำขณะรับเข้ารักษาต่อผลภาวะไม่พึงประสงค์ในหออภิบาลผู้ป่วยหนักศัลยกรรมทั่วไปในโรงพยาบาลมหาวิทยาลัยระดับตติยภูมิ**

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ภูมิหลัง: แม้ว่าอัลบูมินเป็นตัวบ่งชี้ของภาวะโภชนาการแต่ระดับของอัลบูมินมักจะต่ำในภาวะเจ็บป่วยและผลของระดับดังกล่าวยังเป็นที่ถกเถียงกัน วัตถุประสงค์ของการศึกษานี้เพื่อศึกษาผลของระดับอัลบูมินที่มีผลต่อภาวะแทรกซ้อนและการเสียชีวิตในผู้ป่วยศัลยกรรมที่รับเข้ารักษาในหออภิบาลผู้ป่วยหนักศัลยกรรม

วิธีการศึกษา: ผู้วิจัยทำการศึกษาจากระเบียนประวัติในฐานข้อมูลระหว่างปี ค.ศ. 2011 - 2013 ผู้ป่วยที่ที่รับการคัดเลือกจะได้รับการสังเกตการณ์ บันทึกระดับอัลบูมิน ความรุนแรงของโรค ชนิดของการรักษา ลักษณะของผู้ป่วยในขณะเข้ารักษาในไอซียู ผลการรักษาที่ติดตามได้แก่ระยะเวลาที่ใช้เครื่องช่วยหายใจ ระยะเวลาที่นอนโรงพยาบาลและไอซียู ภาวะแทรกซ้อนทางการหายใจ การติดเชื้อ ภาวะไตวายเฉียบพลัน การติดเชื้อของแผลผ่าตัด ภาวะเลือดออกในทางเดินอาหาร ภาวะเพ้อคลั่ง การชัก กล้ามเนื้อหัวใจตาย และการเสียชีวิต ผู้วิจัยได้ทำการแบ่งผู้ป่วยเป็น 2 กลุ่มคือระดับอัลบูมินปกติ (≥ 3.5 กรัม/ดล) และ ภาวะอัลบูมินในเลือดต่ำ (<3.5 กรัม/ดล.)

ผลการศึกษา: ผู้ป่วยจำนวน 893 คน ได้รับการติดตามและวิเคราะห์ในการศึกษานี้ ผู้ป่วยที่มีภาวะปกติและอัลบูมินในเลือดต่ำคือ 106 ราย (ร้อยละ 11.9) และ 787 ราย (ร้อยละ 88.1) ตามลำดับ หลังจากทำการปรับค่าในแบบจำลองพหุถดถอย ภาวะอัลบูมินในเลือดต่ำมีความเสี่ยงสูงอย่างมีนัยสำคัญในความเสี่ยงของการติดเชื้อ [อัตราส่วนความเสี่ยง(ความเชื่อมั่นร้อยละ 95): 2.68 (1.35 - 5.30); $p = 0.005$] โดยเฉพาะการติดเชื้อในระบบทางเดินหายใจ [2.08 (1.01 - 4.27); $p = 0.046$], ภาวะไตวายเฉียบพลัน [4.06 (1.44 - 11.47), $p = 0.008$], และการเสียชีวิต [5.92 (2.12 - 16.54); $p = 0.001$]

สรุปผลการศึกษา: อุบัติการณ์ของภาวะอัลบูมินต่ำในเลือดพบได้บ่อยในไอซียู ภาวะอัลบูมินต่ำในเลือดเพิ่มความเสี่ยงต่อการติดเชื้อโดยเฉพาะอย่างยิ่งในระบบทางเดินหายใจ ภาวะไตวายเฉียบพลันและการเสียชีวิต

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Original Article

Tension Gastrothorax in Diaphragmatic Injuries: The Incidence and Case Series on a Trauma Center Level I of Northern University Based Hospital in Thailand

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Abstract

Background: **Tension gastrothorax is a rare complication but life-threatening condition in case of diaphragmatic injury. However, there was no report on this condition in Thailand. Therefore, the objective of this study was to find the incidence and describe tension gastrothorax in blunt diaphragmatic injuries in our setting.**

Materials and Methods: **We reviewed a five-year retrospective data from a trauma center level I of Northern University-based hospital in Thailand. The baseline data, mechanism of injury, and radiologic study results were collected. Details of cases were described and summarized.**

Results: **During the five-year period, there were 53 cases of diaphragmatic injury and only 3 (5.7%) suffered from tension gastrothorax. All the patients had the same mechanism of injury (the blunt injury from high-speed vehicle collisions). The pelvic fractures were the associated injuries of all patients. All of the cases could be identified the condition by chest radiography. One patient had a miss diagnosis on initial diagnosis as tension pneumothorax. The decompression of stomach by nasogastric tube was an initial adjunctive intervention during resuscitation. The emergency surgery was necessary in cases of severe hemodynamic and respiratory compromise as well as non-success of decompression of the gastric volume.**

Conclusion: **Tension gastrothorax is a rare life threatening condition in diaphragmatic injury. Severe blunt injury with pelvic fracture is common mechanism and concomitant injury. The gastric decompression with nasogastric tube is an initial adjunctive therapy during resuscitation.**

Keywords: **Tension gastrothorax, diaphragmatic injury, life threatening condition, multiple injuries.**

INTRODUCTION

Post-traumatic tension gastrothorax was first described in 1984, and it is a rare complication of diaphragmatic injury[1]. This occurs in case of diaphragmatic injury when a dilated stomach herniates into the thoracic cavity causing cardiopulmonary instability due to a mediastinal shift to the unaffected side[2]. Most previous data on acute post-traumatic tension gastrothorax was a case report or case series. The incidence was unknown and no previous report in Thailand[3-10]. Therefore, the primary objective of this study was to estimate the incidence of tension

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gastrothorax in patient who suffered from blunt diaphragmatic injuries. The second objective were was common findings on these cases including the mechanism of injury, clinical presentation, radiographic results.

Materials and Methods

The trauma center database was retrieved and reviewed for all diaphragmatic injuries in Maharaj Nakorn Chiang Mai Hospital. This hospital is a University-based hospital and a level-I trauma center in the Northern region of Thailand. We reviewed all cases for a five years' period between 2009 and 2013. The baseline data were collected including age, gender, mechanism of injury, Trauma Score-Injury Severity Score (TRISS-score), associated injury, length of hospital stay (LOS), result of treatment and cause of death. The descriptive data of continuous variables were reported as mean and the categorical variables were reported as percent. The Ethic Committee of Faculty of Medicine, Chiang Mai University approved this study (Research ID: 2091/Study code: SUR-2557-02091).

Results

During the study period, a total of 53 cases were diagnoses with traumatic diaphragmatic injury. The baseline characters were summarized in Table 1. Most of the patients were male (81%), the mean age of the patients was 28 years (range 1 - 74), mean of TRISS score was 0.908, and length of hospital stay was 16 days. Penetrating injuries (stab and gunshot wound) were the most common mechanism of injury [blunt:14 (70%)], Of these, only a total of 3 cases had tension gastrothorax. The left diaphragmatic injury was more common than the right side. Bilateral diaphragmatic injuries were found on the patient who got penetrating and blunt injuries. Seven cases died due to massive bleeding and multiple organ failure. We reported of these 3 cases of acute posttraumatic tension gastrothorax and described as following.

Table 1 Demographic data of traumatic diaphragmatic injuries

Total (N)	N=53
Gender (%)	
Male	43 (81)
Female	10 (19)
Mean age in year (min - max)	29 (1 - 74)
Mean TRISS score	0.908
Mean length of stay (day)	17
Mechanism of injury (%)	
Blunt	16 (30)
Stab	18 (34)
Firearm	19 (36)
Site of injury (%)	
Left side	30 (56)
Right side	20 (38)
Bilateral	3 (6)
Tension gastrothorax (%)	3 (6)
Death (%)	7 (13)
Massive bleeding	4 (7)
Multi-organ failure	3 (5)
Associated injuries (%)	
Pneumothorax - hemothorax	43 (81)
Liver	25 (51)
Spleen	15 (30)
Stomach	12 (26)
Small bowel	7 (9)
Large bowel	6 (11)
Bone Fracture	6 (11)
Kidney	5 (8)
Pelvic	5 (6)
Bladder	3 (6)
Head	2 (4)
Heart	2 (4)
Spinal cord	1 (2)

Case 1

A 15-year-old girl who was riding on her motorcycle, she crashed into the back of a pick-up car and she was sent to a primary care hospital. Initial assessment revealed mild hypoxemia (Oxygen saturation was 91%), which was corrected by oxygen support and both lungs were clear. Tachycardia was detected (pulse rate 135/min) but blood pressure was normal. There was a large laceration in the lower anterior abdomen approximately 20 cm. in length exposing an open pelvic fracture site. Moreover, she had got gross hematuria and a deformity of the right thigh. At the time of transfer, her blood pressure had dropped to 70/40 mmHg so the patient was intubated and resuscitation with normal saline solution 2,000 ml. When she arrived at the emergency department, emergency doctor detected a minimal decrease in breath sound in the right chest, pulse rate was 150/min, blood pressure was 86/57 mmHg, oxygen

saturation was 100% and FAST (focus assessment sonography in trauma patient) was positive. The trauma surgeons planned for an emergency laparotomy and a chest x-ray was taken with a portable machine before the patient was taken to the operating theatre. We detected an abnormality of chest x-ray in operative room. On examination the X-ray film showed no lung marking in the left thoracic cavity, and we could not see the left border of the diaphragm (Figure 1). The first diagnosis was tension pneumothorax. The needle decompression was carried out. Air and gastric contents were drained from the needle thoracentesis. An intercostal tube was inserted but no air was reached from the chest drain. Therefore, the diagnosis was tension gastrothorax. A nasogastric tube was inserted and the gastric content was drained. The vital signs were stabilized after resuscitation. An emergency laparotomy was performed immediately to reduce the stomach, repair diaphragm, repair urinary bladder and temporarily close the abdomen. Injury in this patient includes bilateral diaphragmatic injury with left tension gastrothorax, liver injury grade 1, splenic injury grade 2, colonic injury, intra-peritoneal urinary bladder rupture, open comminuted pelvic fractures with fractured acetabulum and left ureter injury.

Most of injuries (except ureter injury) were detected and treated by an emergency laparotomy for damage control procedure with an external fixation of the pelvic fracture. Treatment of ureter injury was carried out with percutaneous drainage and cystoscopy with a double J-stent insertion. After first treatment about 5 months, complete left upper ureter stricture was detected and surgical correction was done. This patient was admitted in hospital for a total of 36 days.

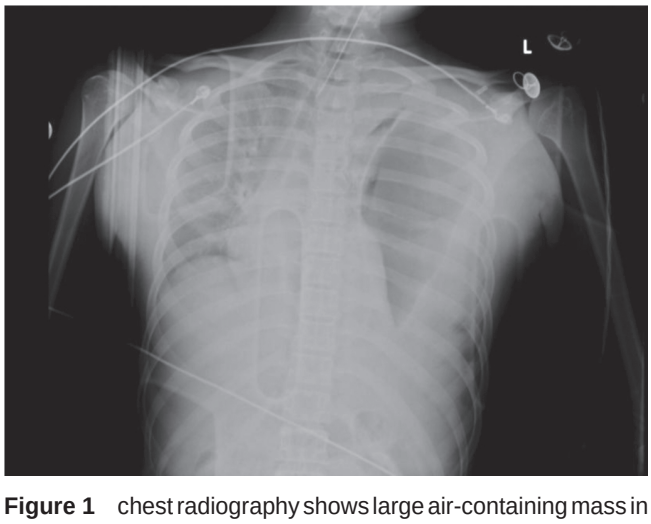

Figure 1 chest radiography shows large air-containing mass in left thorax, loss of lung marking and diaphragmatic outline with mediastinum shift to the right. Initial diagnosis was tension pneumothorax.

Case 2

A 58-year-old man who was riding on a motorcycle and crashed into a truck. In the primary care hospital, he had cyanosis, hypotension (blood pressure 85/58 mmHg) and bradycardia (pulse rate 57/min). Initial management was intubation and fluid resuscitation. The other injuries detected included a laceration of the scrotum, deformity of left thigh and gross hematuria. Chest radiography revealed a left diaphragmatic injury and herniation of the stomach into the left thoracic cavity, which caused a mediastinum shift to the right (Figure 2). On arrival at the Emergency Department, his blood pressure was 80/40 mmHg, pulse rate was 60/min, oxygen saturation was 79%, FAST was positive and sphincter tone was loose. The nasogastric tube was inserted but it did not success. We performed emergency laparotomy. The intra-operative findings were left diaphragmatic injury with tension gastrothorax, open book pelvic fracture, splenic injury, intra-peritoneal urinary bladder rupture, closed fracture in the shaft of the left femur.

In operative theater, pulseless electrical activity (PEA) was detected and the cardio-pulmonary resuscitation (CPR) was initiated. After reduced stomach into abdominal cavity, arrhythmia was temporary improve. The CPR was performed for three times, the estimated blood loss was 4,000 ml. The patient passed away at 2 hours after surgery.

Case 3

A 3-year-old girl was a messenger on the pillion of motorcycle. She was thrown from the motorcycle after frontal impact with a car. Her mother died at the scene and her father had the severe head injuries. At the community-hospital, her pulse rate was 150/min, she had tachypnea and abdominal distension. On arrival at the emergency department, her blood pressure was 100/70 mmHg, pulse rate was 155/min, oxygen saturation was 91% and breath sound of left chest was decrease. The tension gastrothorax was detected with chest x-ray (Figure 3). An emergency laparotomy was

performed without any initial decompression of stomach on emergency department. Her pelvic fracture was successful treated conservatively. She was discharged after 7 days and her recovery was uneventful.

For summarization (Table 2), the blunt mechanism was the cause of all tension gastrothorax in our series, hypoxemia with unstable hemodynamic were the life-threatening condition at hospital presentation. The pelvic fracture was an associated injury. The vital signs were prone to disturb on a toddler. The possible pathophysiology was the greater risk of developing tension gastrothorax because of an unfixed mediastinum. The possible cause of mortality was massive bleeding and tension gastrothorax induced mediastinal shift and led to cardiac arrest. Regarding the diagnostic modality, chest X-rays were an initial tool at adjunctive investigation but misdiagnosis with tension pneumothorax should be concerned. For initial treatment, nasogastric tube decompression could be

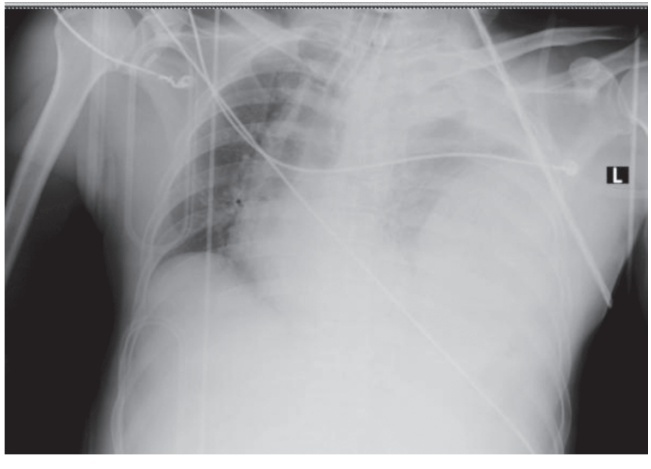

Figure 2 chest radiography shows marked elevation of left side of the diaphragm, haziness of left hemithorax and mediastinum shift to the right.

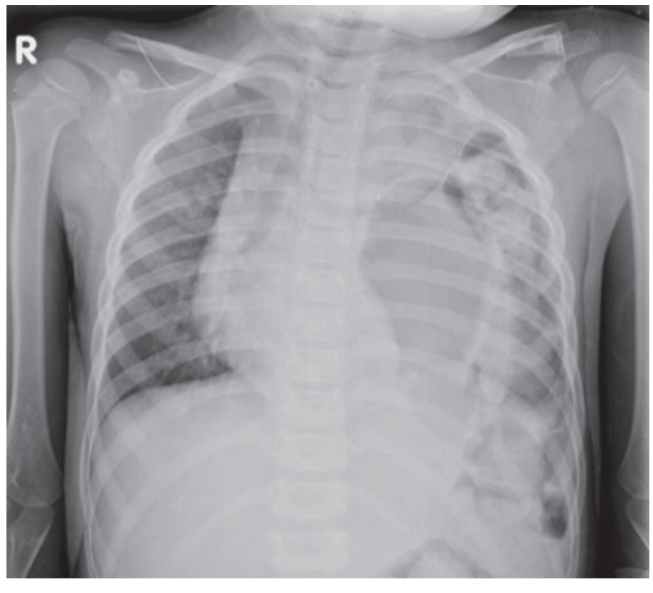

Figure 3 chest radiography shows a dilated stomach and the transverse colon herniated into the left thoracic cavity and mediastinum shift to contralateral side

Table 2 the summarized of clinical presentation, treatment and outcome in tension gastrothorax

Clinical presentation and outcmoes	Case 1	Case 2	Case 3
Mechanism of injury	Blunt	Blunt	Blunt
Age	15 year-old	58 year-old	3 year-old
Associated injury	Pelvic fracture Urologic injury Liver, spleen, colon injury	Pelvic fracture Urologic injury Lower extremity fractrue	Pelvic fracture
Oxygenation at ED	Hypoxemia	Hypoxemia	Hypoxemia
Hemodynamic at ED	Unstable	Unstable	Unstable
Diagnosis modality	Chest X ray	Chest X ray	Chest X ray
Miss diagnosis at ED	Yes (Tension pneumothorax)	No	No
Gastric decompression at ED	No (miss diagnosis)	No (unsuccessful insertion)	No
Surgical treatment	Yes (Repair diagram, bladder and temporary abdominal closure)	Yes (cardiac arrest at operative theater)	Yes (Repair diaphragm)
Treatment outcomes	Survive	Non-survive (massive bleeding, cardiac arrest)	Survive

ED, emergency department

used for stabilization of the patient. However, this intervention might be non-success due to tube kinking and insertion difficulty. The emergency laparotomy for reduction of visceral organs is the treatment of choice. This is the life-saving procedure especially in case of decompression failure with nasogastric tube.

Discussion

Bedside traumatic patients, the tension gastrothorax could be found in others conditions such as a congenital diaphragmatic hernia, a large hiatal hernia and also after thoracoabdominal surgery[3,11,12]. Regarding the trauma cases, the incidence of tension gastrothorax accounted for 6 percent of diaphragmatic injuries in our database. acute post-traumatic tension gastrothorax are mostly associated with blunt mechanism[3-10]. Delayed tension gastrothorax could be found in both blunt and penetrating injuries including postsurgical repairment[1,2,11-22].

In our series, all of the post-traumatic tension gastrothorax were associated with high-speed vehicle collisions. These might be a result of a large force impact on the anterior abdominal wall which lead to an abrupt increase in intra-abdominal pressure and a high-pressure gradient across the diaphragm. The diaphragm is the weakest point of abdominal cavity and these high pressure results in a large diaphragmatic laceration especially on left sided diaphragm[5]. In normal physiology the intrathoracic pressure is usually negative and pressure in abdomen is higher than thoracic cavity. When the diaphragm has a defect, visceral organs would be sucked and herniated from the abdominal cavity into the thoracic cavity. The most common herniated organ is the stomach[3]. A distended stomach can then cause lung collapse and increase intrathoracic pressure. These result in patients developing dyspnea and hypoxia. The cardiovascular collapse in tension gastrothorax may result from mediastinal shift as well as massive bleeding due to associated organ injuries especially in pelvic fracture. In our series, the symptom of dyspnea, hypoxia and hypotension are clinical presentations of acute post-traumatic tension gastrothorax which mimics tension pneumothorax[3,5-8,10].

Although audible bowel sounds in the chest help to diagnose intra-abdominal organ herniation but it is rarely detected[1,6,19,20]. Chest radiography is a useful for diagnosis. The hallmark findings for diagnosis are the loss of diaphragmatic outline and a large gastric shadow occupying in the left thorax with mediastinal shift to the right[5,6]. (Table 3)

Table 3 Hallmark to suspect traumatic tension gastrothorax

Severe mechanism of injury (mostly in blunt)
Unstable hemodynamic and respiratory compromise
Severe associated injuries (mostly having pelvic fracture)
Audible bowel sounds in chest examination (rare)
Chest X ray diagnostic signs
- Loss of diaphragmatic outline
- Large gastric shadow occupying in the left thorax
- Mediastinal shift to the right
Symptom improve after gastric decompression

The definitive treatment is the emergency laparotomy for reduction of the visceral organs and repair of the diaphragmatic injury[4-7,9,10]. However, in patients with severe unstable hemodynamics, nasogastric decompression is an essential procedure but may be nonsuccess due to tube kinking and tube could not be reach to stomach because of stuck with lower esophageal sphincter at diaphragmatic level[3,4].

Another decompression procedure may be considered if nonsuccess nasogastric decompression, such as needle thoracenthesis and insertion of a chest drain.[3,5-7,17].

The most common cause of death in diaphragmatic injuries is massive bleeding due to associated injuries but tension gastrothorax may aggravate the cause of death due to the promotion of cardiovascular collapse by mediastinal instability.

Conclusion

Acute post-traumatic tension gastrothorax should be considered following high speed vehicle crashes with multiple injuries. Patients present with hypoxia, shock and decreased breath sound in left hemithorax which may mimic tension pneumothorax. Chest radiography is useful for diagnosis and emergency laparotomy for reduction of the visceral organs with repair of the diaphragmatic injury are the treatments of choice. In severe hemodynamic instability, nasogastric decompression is necessary as initial intervention. However, this might be nonsuccess due to tube kinking and stuck with lower esophageal sphincter.

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บทคัดย่อ **ภาวะแรงดันสูงในช่องอกจากกระเพาะเคลื่อนเข้าสู่ช่องอกและโป่งตัวในการบาดเจ็บของกะบังลม: อุบัติการณ์และกลุ่มผู้ป่วยในศูนย์อุบัติเหตุระดับ 1 ของโรงพยาบาลมหาวิทยาลัยทางภาคเหนือของประเทศไทย**

ธิดารัตน์ จิระพงศ์เจริญลาภ, นเรนทร์ โชติรสนิรมิต, กวีศักดิ์ จิตตวัฒนรัตน์, กำธน จันทร์แจ่ม
ภาควิชาศัลยศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

ภูมิหลัง: ภาวะกระเพาะเคลื่อนเข้าสู่ช่องอกและโป่งตัวจนทำให้เกิดแรงดันสูงในช่องอกเป็นภาวะแทรกซ้อนที่พบได้น้อยแต่เป็นภาวะคุกคามแก่ชีวิตในผู้ป่วยที่มีการบาดเจ็บของกะบังลม อย่างไรก็ตาม ไม่เคยมีรายงานภาวะดังกล่าวในประเทศไทย ดังนั้น การศึกษานี้มีวัตถุประสงค์เพื่อหาอุบัติการณ์และบรรยายภาวะกระเพาะเคลื่อนเข้าสู่ช่องอกและโป่งตัวจนเกิดแรงดันสูงในช่องอกในสถานพยาบาลของผู้วิจัย

วิธีการศึกษา: ผู้วิจัยได้ทบทวนผู้ป่วยจากฐานข้อมูลของศูนย์อุบัติเหตุระดับ 1 ของโรงพยาบาลมหาวิทยาลัยในภาคเหนือระยะเวลา 5 ปี โดยทำการเก็บข้อมูลพื้นฐาน กลไกการบาดเจ็บ ภาพถ่ายรังสี โดยผู้วิจัยได้บรรยายลักษณะและสรุปผลป่วยที่มีภาวะดังกล่าว

ผลการศึกษา: ระหว่างระยะเวลา 5 ปี มีผู้ป่วยที่มีการบาดเจ็บของกะบังลมจำนวน 53 ราย และพบว่ามีเพียง 3 ราย (ร้อยละ 5.7) ที่มีภาวะกระเพาะเคลื่อนเข้าสู่ช่องอกและโป่งตัว ผู้ป่วยเหล่านี้มีกลไกการบาดเจ็บที่เหมือนกัน (การกระแทกจากอุบัติเหตุการจราจรที่ใช้ความเร็วสูง) ผู้ป่วยเหล่านี้มีการบาดเจ็บของกระดูกเชิงกรานร่วมด้วยทุกราย และสามารถทำการวินิจฉัยจากภาพถ่ายรังสี ผู้ป่วย 1 รายให้การวินิจฉัยผิดในครั้งแรกเป็นลมในช่องหุ้มปอด การใส่สายจมูกเพื่อลดขนาดของกระเพาะอาหารเป็นการรักษาเบื้องต้นระหว่างทำการช่วยชีวิต การผ่าตัดฉุกเฉินเป็นสิ่งที่จำเป็นในผู้ป่วยที่ภาวะไหลเวียนและการหายใจผิดปกติรวมถึงไม่สามารถลดขนาดกระเพาะได้จากการใส่สายจมูก

สรุป: ภาวะกระเพาะเคลื่อนเข้าสู่ช่องอกและโป่งตัวเป็นภาวะที่คุกคามแก่ชีวิตที่พบได้น้อยการบาดเจ็บของกะบังลม การกระแทกที่รุนแรงร่วมกับกระดูกเชิงกรานหักเป็นกลไกที่พบได้บ่อยและการบาดเจ็บที่พบร่วมกัน การใส่สายจมูกเข้าไปกระเพาะอาหารเพื่อลดขนาดเป็นการรักษาเบื้องต้นในระหว่างการช่วยฟื้นชีพ

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GENERAL SURGERY

COLONIC DETOXIFICATION VERSUS POLYETHYLENE GLYCOL-ELECTROLYTE LAVAGE SOLUTION FOR BOWEL PREPARATION BEFORE COLONOSCOPY: A RANDOMIZED CONTROLLED TRIAL

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Background: Colonoscopy has been well established as the gold standard of the colorectal cancer screening that enables simultaneously biopsy or polypectomy. However, complete bowel preparation is required in colonoscopy. Inadequate bowel cleaning can lead to missing lesion, prolonging procedure duration, and increase patient discomfort. Bowel preparation with polyethylene glycol-electrolyte lavage solution (PEG-ELS) is considered as the best safety method. However, some patient can't tolerate a large volume of fluid intake. Thus, colonic detoxification is alternative method that can be used for bowel cleansing before colonoscopy procedure that has been implemented in Hatyai Hospital for many years. The objective of this study was to compare the efficacy and safety between colonic detoxification and PEG-ELS for bowel preparation before colonoscopy.

Objectives: The objective of this study was to compare the efficacy and safety between colonic detoxification and PEG-ELS for bowel preparation before colonoscopy.

Materials and Methods: A prospective randomized control study was conducted to compare the quality of bowel cleansing using quality grading and Boston Bowel Preparation Scale (BBPS). The main predictor was the method of bowel preparation. The bowel was prepared using colonic detoxification or the PEG-ELS.

Results: A total of 74 participants were randomly assigned to receive colonic detoxification (n = 37) or PEG-ELS (n = 37). Both groups of patients had similar baseline characteristics. PEG-ELS was associated with better quality grading of bowel preparation, total BBPS and scores at each segment. The results showed that there were no significant differences in satisfaction score, adverse effects, colonoscopic duration and colonoscopic finding.

Conclusions: In conclusion, colonic detoxification is considered an alternative safety method for bowel preparation before colonoscopy. Although quality grading of bowel preparation and BBPS in colonic detoxification is significant lower than PEG-ELS, it is considered high BBPS (more than 5) and significant difference in polyp detection rate was not found.

COMPARISON OF CLINICAL OUTCOMES BETWEEN SURGICAL OPEN GASTROSTOMY AND PUSH-METHOD PERCUTANEOUS ENDOSCOPIC GASTROSTOMY: A SINGLE INSTITUTION EXPERIENCE

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Background: Gastrostomy is preferred route of

enteric feeding in patients with upper aero-digestive malignancies. There is no clinical trial comparing surgical (open) gastrostomy (SG) and push method of percutaneous endoscopic gastrostomy (P-PEG) in patients with upper aero-digestive cancer.

Objective: The objective of study was to compare clinical outcomes between SG and P-PEG.

Methods: Medical records of patients with upper aero-digestive malignancies who underwent SG and P-PEG at our institution from January 2014 to December 2017 were reviewed. The incidence of post-operative adverse events, duration of procedure, pain score at 24 hours after procedure, length of hospital stay (LOS), cost, and procedure-related mortality were compared between procedures.

Results: There were 99 patients: 53 in the SOG, and 46 in P-PEG groups. The SG cohort had higher incidence of post-operative adverse events (28% vs. 4%, $p = 0.002$), longer duration of procedure (52 ± 21 minutes vs. 29 ± 5 minutes, $p < 0.001$), higher pain score at 24 hours after procedure (5.2 ± 3.1 vs. 2.3 ± 2.7, $p < 0.001$), longer LOS (6 ± 3 days vs. 4 ± 3 days, $p = 0.003$). There were no significant differences in terms of cost (41,870 ± 24,275 Baht vs. 39,575 ± 21,814 baht, $p = 0.624$) and mortality rate (4% vs. 0%, $p = 0.493$). Type of procedure was an important factor for post-operative adverse events on multivariate analysis (*p*-PEG vs. SG: OR=0.12, 95%CI, 0.02 to 0.64).

Conclusion: P-PEG is associated with lower incidence of post-operative adverse events, shorter procedure duration, lower 24-hour postoperative pain score, and shorter length of hospital stay.

COMPARISON OUTCOME OF LAPAROSCOPIC HELLER MYOTOMY WITH PERORAL ENDOSCOPIC MYOTOMY FOR ACHALASIA

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Background: Achalasia is a primary motility disorder of the esophagus characterized by insufficient lower esophageal sphincter (LES) relaxation and loss of esophageal peristalsis. An Incidence of disease is about 0.03-1.1 in 100,000 individuals annually. Nowadays, gold standard of treatment is laparoscopic heller myotomy (LHM). Peroral endoscopic myotomy (POEM) is an alternative technique to create myotomy via natural orifice transluminal endoscopic surgery (NOTES) technique instead of laparoscopic approach in LHM.

Objective: This study showed the treatment outcomes comparing in LHM and POEM group. The primary outcome is recurrence rate of achalasia. The secondary outcomes are length of hospital stay, complication rate, operative blood loss, operative time, myotomy length, pain score, Eckardt score at post-op 1 and 6 months, and LES pressure.

Materials and Methods: Retrospective chart review of 93 patients, who was diagnosed achalasia and underwent LHM and POEM from 2001-2016 in single institute database. Fifty patients were treated with LHM and 43 patients were treated with POEM. The patient characteristics and severity of symptom were matched in both groups.

Results: The primary outcome, recurrence rate in 24 months post operatively was 6 vs. 4.7% (LHM vs. POEM) ($p = 1.0$), The secondary outcomes are length of hospital stay 5.82 vs. 4.37 days ($p < 0.01$), operative blood loss 48.2 vs. 7.2ml ($p < 0.01$), mean operative time 202 vs. 95 minutes ($p < 0.01$), myotomy length 9.2 vs. 14 cm ($p < 0.01$), pain score 4.2 vs. 2.6 ($p < 0.01$), postoperative 6 months Eckardt score 0.38 vs. 0.69 ($p = 0.162$) and mean LES pressure also decreased from a mean of 26.7 to 13.6 mmHg after POEM ($p < 0.01$). No serious complications related to LHM and POEM were encountered. Complications after POEM were mucosal injury (18.6%) and pneumoperitoneum (34.3%) without need of any additional treatment.

Conclusion: POEM group showed less length of hospital stay, operative blood loss, operative time and post-op pain than LHM group and statistically non-significant in recurrence rate, postoperative Eckardt score. Follow up post operatively 24 months in POEM group showed clinical improve, equally recurrence rate with LHM group and without serious complications.

CRITICAL VIEW OF SAFETY IN PREVENTTION OF BILIARY TRACT INJURIES DURING LAPAROSCOPIC CHOLECYSTECTOMY AT HATYAI HOSPITAL

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Background: The critical view of safety (CVS) is a method for identifying the cystic duct during laparoscopic cholecystectomy (LC) to prevent misidentification of the bile duct and avoid biliary tract injury.

Objective: To compare incidence of bile duct injury in the group using CVS and the conventional group not using CVS.

Materials and Methods: We perform a medical record review of all patients undergoing laparoscopic

cholecystectomy (LC) at Hatyai hospital from November 2015 to February 2018. One group (Group 1), consisting of 2 consultants and 3 surgical fellows, used critical view of safety (CVS) to identify cystic duct before clipping and dividing the duct by taking snapshot of CVS and later signing documents to confirm identification. In the second group (Group 2), consisting of 7 other consultants in Department of Surgery, CVS was not a mandatory. Demographic data, operative techniques, operative time, complications were collected from the records.

Results: A total 510 patients underwent LC during the period. There were 239 patients in Group 1 and 271 patients in Group 2. There were three bile duct injuries in Group 1 (1.3%) and one bile duct injury in Group 2 (0.4%).

Conclusion: CVS cannot solely prevent bile duct injuries in our series.

DOES PYLORIC-RING RESECTION IN PANCREATICO-DUODENECTOMY PREVENT DELAYED GASTRIC EMPTYING?

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Background: Pylorus-preserving pancreaticoduodenectomy (PPPD) has been widely used in periampullary and pancreatic head cancer treatment; however, delayed gastric emptying is not infrequent. Delayed gastric emptying after pancreaticoduodenectomy increases treatment cost and length of hospital stay.

Objective: We report the rate of delayed gastric emptying between two surgical methods-pyloric-ring resection pancreaticoduodenectomy (PRPD) and pylorus-preserving pancreaticoduodenectomy (PPPD).

Materials and Methods: We retrospectively reviewed all patients who underwent pancreaticoduodenectomy in a single institution between June 1, 2014 and July 31, 2017, and placed them into either the pyloric-ring resection or the pylorus-preserving pancreaticoduodenectomy group. Descriptive analyses were conducted on the demographic, preoperative, intraoperative and postoperative details. The rate of delayed gastric emptying according to the definition proposed by the international study group of pancreatic surgery (ISGPS) was the primary endpoint. The secondary endpoints were postoperative hospital stay, intraoperative blood loss and blood transfusion, operative time and postoperative complications.

Results: Seventy-four patients were enrolled; 25 patients in the PPPD group and 49 in the PRPD group. The overall incidence of DGE was 29.7% (22 of 74 patients). The incidence of DGE in the PPPD group was statistically higher than that of the PRPD group (48.0% vs. 20.4%, $p = 0.029$). Postoperative hospital stay was 8 days in both groups. There was no significant difference in operative times, blood loss, incidence of perioperative blood transfusion and postoperative complications.

Conclusion: Patients undergoing pyloric-ring resection pancreaticoduodenectomy fared better in terms of delayed gastric emptying compared to their counterparts who underwent pylorus-preserving pancreaticoduodenectomy. Complication rates between two groups were not statistically significantly different.

EARLY AND LATE OUTCOMES OF ASYMPTOMATIC ABDOMINAL AORTIC ANEURYSM TREATED WITH ENDOVASCULAR ANEURYSM REPAIR IN DIFFERENCE AGE GROUPS

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Background: Abdominal aortic aneurysm is common for male patients, increasingly with age. The traditional treatment is still open repair. Endovascular aneurysm repair (EVAR) has been increasingly performed for two decades, which shows the decrease in 30-day morbidity and mortality compared with open repair. However, the outcomes in young and elderly age group have not been studied.

Objectives: To investigate the early and late outcomes of EVAR among the three different age groups of asymptomatic aortic aneurysm repair.

Material and Methods: We reviewed the prospective AAA database who underwent elective EVAR from January 2012 to December 2017. These patients were classified into three groups by age: less than 70, between 70-80 and more than 80. Primary end point was 30 day post operative mortality. Secondary end points were composed of procedural details, peri-operative complications, re-intervention and survival rate during late follow-up.

Results: 290 patients included in this study. 30 days mortality was not statistical significantly among three groups (age < 70 yr 0 (0%), 70-80 yr 2 (1.4%) and > 80 yr 1 (1.1%)

(p=0.82). In addition, there were no statistical significances in procedural details, peri-operative complications in all three groups (age < 70 yr 8 (15.1%), 70-80 yr 17 (11.6%) and > 80 yr 18 (20.2%) (p = 0.201). At 5-year follow-up, the re-intervention free time was not statistically significant among three groups (age < 70 yr 52 (96.3%), 70-80 yr 144 (97.9%) and > 80 yr 86 (96.6%) (p=0.85). However, the survival time in age group less than 70 years was significantly much longer than the other two groups (age < 70 yr 88.89%, 70-80 yr 72.1% and > 80 yr 65.1%) (p = 0.02). No aneurysm related death in this study.

Conclusion: EVAR might be feasible in AAA management in all age group. During five-year follow-up, there was no difference in re-intervention rate and the death of three study groups, but the survival time of the youngest age group (less than 70) was statistically significant better than the others.

EVALUATION OF SURGICAL COMPLICATIONS IN A UNIVERSITY HOSPITAL: ROOT CAUSE ANALYSIS

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Background: Despite the advance of surgery in the modern days; surgical complications can still occur, causing morbidity and sometimes mortality in surgical patients. Hence, surgical morbidity and mortality conference is crucial for quality of care improvement. Analyzing preventability and root causes helps prevent reoccurrence of the complications.

Objective: In the present study, we analyzed our General Surgery morbidity and mortality conferences in King Chulalongkorn Memorial Hospital (a 1400-bed university hospital) in terms of preventability and root causes.

Methods: We retrospectively reviewed our morbidity and mortality conferences from October 2012 to October 2016. The data collection included diagnostic groups, organ systems, severity, preventability, and root cause analysis (RCA) of the complications. Outcome of the patients was also obtained.

Results: There were 676 complications occurring during the study period. The most common organ system involved was gastrointestinal/Hepatobiliary-pancreatic system (42.8%). According to the Clavien-Dindo classification, severity of the complications was classified to grade 1 (20.7%), grade 2 (18.9%), grade 3 (41.6%), grade 4 (3.7%) and grade 5 (15.1%). We classified 27 complications as preventable (4.0%), 573 as potentially preventable (84.8%), and 76 as unpreventable (11.2%). RCA of the preventable and potentially preventable complications revealed that root causes were defect in preoperative management (6.1%), defect in intraoperative management (61.3%), defect in postoperative management (27.0%), and defect in a diagnostic/management decision (5.6%). Majority of the patients (80.2%) had a full recovery from the complications, while 4.7 % had residual functional impairment and 15.1% died.

Conclusions: The present study demonstrated that the majority of complications in general surgery were preventable or potentially preventable. RCA showed that the most common root cause was defect in intraoperative management.

IMPROVEMENT OF TRANSPLANTED KIDNEY BIOPSY YIELD BY USING CHULA SMART LENS

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Background: Smart lens is a magnifying device which turns the smart phone into microscopic exploring instrument. It is convenient, cheap and portable. The purpose of this study was to examine if using Chula smart lens would increase the yield of kidney biopsy in transplanted kidney.

Objective: To examine if using Chula smart lens would increase the yield of kidney biopsy in transplanted kidney.

Material and methods: A total of 96 consecutive biopsies (standard group n = 50, smart lens group n = 46) during 1 June 2016 - 30 November 2017 in Srinagarind hospital were included. Clinical data, diagnostic quality and complication were retrospectively reviewed.

Results: Baseline characteristics were well balanced between two groups. The positive glomeruli rate in smart lens group was 100% and significantly higher than conventional group with the rate of 84%, p <0.01. The adequacy of tissue for pathological diagnosis was also higher in those obtained by using smart lens compared to standard arm; 93% vs. 80% respectively, p = 0.05. The mean number of biopsied cores was 3.4 cores in smart lens group and 3.0 cores in standard group. The complication rates were comparable between two arms. Four patients in smart lens group developed gross hematuria which was completely resolved after conservative treatment.

Conclusion: Using Chula smart lens result in more positive glomeruli, better histological quality and diagnostic yield with comparable complications compared to standard procedure.

IN HOSPITAL BOWEL PREPARATION IN ELECTIVE COLONOSCOPY IMPROVING BOWEL PREPARATION AND COST-EFFECTIVENESS

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Background: Colonoscopy is modality of choice for colorectal cancer screening and prevention. Giving good information about bowel preparation is crucial for colonoscopy effectiveness in detecting precancerous polyps and cancer. Suboptimal bowel preparation frequently occurs in poor compliant patients despite counseling session before colonoscopy.

Objectives: This study aims to review results of bowel preparation that can achieve better stool clearance and costs between in hospital and out-patients in elective colonoscopy.

Methods: Patients who underwent elective colonoscopy at a Yala Regional hospital during January 2017 to December 2017 were enrolled. Records of in hospital and out-patient bowel preparation were compared about range of adequate bowel cleansing, procedure time, cost of procedure and admission.

Results: A total of 313 patients in the analysis, classify as patient satisfaction, 99 out-patient and 214 in hospital bowel preparation were match for indication and bowel preparation protocol. The in hospital group was elder than the other (mean age 61 and 57 years old, $p < 0.05$), had more excellent bowel clearance according to Aronchick score ± 3 (94.4%, $p < 0.05$) and significantly more success colonoscopy. The in hospital group had less procedure time than the other. No difference in rate of repeat colonoscopy due to inadequate bowel preparation between two groups. The cost of procedure, only colonoscopy and colonoscopy with biopsy were significantly less in out-patient group than in hospital group but similar when colonoscopy with polypectomy or with other procedures.

Conclusion: In hospital bowel preparation for elective colonoscopy is safe and effective. It offers excellent stool clearance and shorter procedure times. But this may increase chart due to potential cost such as service for admission room. Intensive counselling is need in poor compliance to minimize complications that may outweigh potential cost savings.

INCIDENCE AND RISK FACTORS OF POSTOPERATIVE PANCREATIC FISTULA AFTER PANCREATICODUODENECTOMY: A LARGE TERTIARY CENTER EXPERIENCE

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Background: Postoperative pancreatic fistula (POPF) remains an important complication after pancreaticoduodenectomy (PD). PD is a major operation for treatment of periampullary and pancreatic cancer and the number of operation has increased in recent years.

Objectives: To explore incidence and identify risk factors of POPF.

Material and Methods: We retrospectively reviewed clinical data of 227 patients who underwent PD in Siriraj Hospital between January 2011 and December 2016. POPF was diagnosed and classified into three groups (grade A, B and C) according to the International Study Group on Pancreatic Fistula (ISGPF). Clinical relevant pancreatic fistula (CR-POPF) integrated only grade B and C. Risk factors of POPF after PD were analyzed. Univariate and multivariate logistic regression analysis were used to determine the risk factors correlating with POPF.

Results: Total of 227 patients were included in this study. POPF occurred in 96 patients (42.3%), and were classified into ISGPF grade A 21 patients (21.9%), grade B 54 (56.3%), and grade C 21 (21.9%). CR-POPF rate was 33.0%. Multivariate analysis revealed soft gland texture [Odds ratio (OR): 6.7, 95% confidence interval (CI): 1.4-30.9], small pancreatic duct (P-duct) diameter ≤ 3 mm [OR: 4.6, 95% CI: 1.0-21.4] and surgeons' experience < 10 years [OR: 6.2, 95% CI: 1.4-30.6] were significant risk factors of POPF. Regarding CR-POPF, these three risk factors were also statistically significant in multivariate analysis.

Conclusions: Even in high volume center, incidence of POPF after PD was still high and ISGPF grade B was the most common group. Gland texture, P-duct diameter, and surgeons' experience were independent risk factors for both POPF and CR-POPF.

INCIDENCE OF CHRONIC PAIN IN MESH FIXATION WITH CYANOACRYLATE GLUE IN LAPAROSOPIC INGUINAL HERNIA REPAIR

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Background: Chronic groin pain is one of the long term complications after laparoscopic inguinal hernia repair that may cause problems to quality of life of patients.

Objectives: To study the incidence of chronic pain in mesh fixation with cyanoacrylate glue in laparoscopic inguinal hernia repair at 3 months and 1 year post-operatively.

Materials & Methods: A retrospective study of 50 patients who had undergone laparoscopic inguinal hernia repair with mesh fixation with cyanoacrylate glue. Chronic pain was assessed by phone calls using the Inguinal Pain Questionnaire (IPQ).

Results: At 3 months postoperatively, 46 patients (92%) had no pain and 4 patients (8%) had multilevel of pain from easily being ignored to interfering with most activities. At 1 year, 45 patients (90%) had no pain and 5 patients (10%) had multilevel of pain.

Conclusion: The use of cyanoacrylate glue for mesh fixation in laparoscopic inguinal hernia repair gave the good outcome in terms of chronic pain. It can be an alternative method for mesh fixation.

LAPAROSCOPIC SPLENECTOMY VERSUS OPEN SPLENECTOMY IN HATYAI HOSPITAL

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Introduction: Splenectomy is nowadays widely performed by laparoscopy; we compare the results of two different techniques of surgery, laparoscopic splenectomy versus open splenectomy. The objectives of this research were to evaluate the feasibility, safety, and potential benefits of laparoscopic splenectomy compared with open splenectomy.

Materials and Methods: We retrospectively reviewed all patients undergoing both laparoscopic splenectomy (LS) and open splenectomy (OS) for hematologic disease at Hatyai hospital from January 2013 to December 2017. LS was performed by a semi-lateral approach. Single Incision Laparoscopic Surgery (SILS) Foam Port was inserted at umbilicus. An additional port was added in the epigastrium or left upper quadrant if needed. The technique of splenic hilar control in LS consisted in the dissection of each segmental of secondary splenic vessel at the lower, middle, and upper parts of the spleen. They were then divided without individualizing the artery from the vein. Open splenectomy was done by midline incision and performed by an anterior approach.

Results: Total 32 patients were operated at a mean age of 36.3 years in 21 patients by LS and 17.2 years in 12 patients by OS. The operative time, intraoperative blood loss, postoperative pain score, time to first oral intake, and length of hospitalization for LS/OS were respectively 105/60 mins. (p-value 0.37), 150/120 ml. (p-value 0.37), 3.0/7.2 point (p-value 0.6), 10/28 hours (p-value 0.03), and 6.2/6.9 days (p-value 0.7). Conversion rate of LS was 2 (9.5%).

Conclusion: Laparoscopic splenectomy appeared safe, feasible, less pain in postoperative period and time to intake quicker than open splenectomy. LS was not increased risk of intraoperative bleeding and postoperative complications.

MULTIGENE TEST RISK OF RECURRENT SCORE COULD PREDICT AXILLARY LYMPH NODE METASTASIS IN T1 HORMONAL POSITIVE BREAST CANCER

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Background: The rate of lymph node metastasis in hormonal positive early breast cancer is 16.2-37.5%. Although sentinel lymph node biopsy (SLNB) is the gold standard of axillary assessment, unnecessary axillary operation with consequent arm and shoulder morbidity is to be concerned. Several prediction models and imaging modalities are not sufficiently accurate to substitute SLNB. Multigene profiling could demonstrate prognostic value which classified personalized cancer treatment and additional specific information.

Objectives: This study is to compare PAM50 ROR score in lymph node positive and negative in hormonal positive T1 breast cancer patients.

Materials and Methods: A review was performed in hormonal positive T1 breast cancer patients who underwent surgery in Queen Sirikit Centre for Breast Cancer during

March 2017-May 2018. PAM 50 gene expression was performed on FFPE sections using the Nanostringn Counter technology. *T*-test and Chi square were used to compare descriptive data. The prognostic factors were analyzed by multivariate analysis. Area under curve (AUC) of ROC curve was calculated. The statistic was analyzed by IBM SPSS software version 22.

Results: The study included 34 patients with estrogen receptor positive T1 breast cancer. Mean age was 53 years in N0 and 55 years in N1. There were 28 patients without axillary lymph node involvement and 6 patients with lymph node involvement. ROR score showed significantly predictive value of axillary lymph node involvement. (95% CI 1-1.054) Mean ROR score is 63.1 in LN positive patients and 42.9 in LN negative patients (p-value = 0.047) ROC was demonstrated and AUC was 0.75 (p-value = 0.058). The cut-off value at 40 showed sensitivity 1.0 and specificity 0.42. There were 14 patients (41%) with discordance of intrinsic subtype and surrogate subtype. Notably, there were 4 luminal B surrogate subtype patients exhibited HER enriched intrinsic subtypes.

Conclusions: PAM 50 ROR score is currently used to describe disease prognosis, further adjuvant treatment and intrinsic subtype. According to this study, ROR score seems to be useful to predict lymph node status in hormonal positive T1 breast cancer. This preliminary report showed that ROR score below 40 could exclude lymph node positive patients.

OUTCOME OF SURGERY FOR RETROPERITONEAL SARCOMAS IN SRINAGARIND HOSPITAL

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Background: Retroperitoneal sarcoma (RPS) is a rare malignant soft-tissue tumor that generally manifests as a large mass invading surrounding structure. Late presentation of these tumors is due to associated minimal symptoms, making surgical management difficult. Complete surgical removal is the most important for survival and prevention of recurrence. However, local recurrence of RPS is common. This study aims to report surgical outcomes, overall survival, recurrence rate, disease-free survival of RPS in patients who underwent surgical treatment at Srinagarind hospital.

Methods: A medical record review of all retroperitoneal sarcoma patients who underwent surgical treatment during 2000 - 2016 in Srinagarind Hospital, Khon Kaen University was performed. Tumor characteristics, median survival time, overall survival, recurrence, and complications were examined.

Results: There were 34 surgically treated RPS patients. Almost all RPS were stage IB (94%). The most common histologic type was liposarcoma (71%). The 5-year overall survival rate was 33.8% (95% CI: 18.5% to 49.7). The median survival time was 2.6 years (95% CI: 1.9 - 3.3). Local recurrence occurred in 18 patients (53%). The 5-year survival of patient also underwent subsequent resection of local recurrence0 was 25% and the median survival time was 25 years (95% CI: 2.1 - 3 years). Distant recurrence occurred in 2 patients (6%). Bleeding-related conditions were the most morbidity (41%).

Conclusions: Complete surgical removal of the RPS is the most important for survival of the patients. Subsequent resection of the recurrence still yielded satisfactory results, however. A high rate of local recurrence after surgical removal was noted. Surgeons must be aware of blood loss during the operation.

PILOT STUDY OF TREATMENT OF NO-OPTION CRITICALLIMB ISCHEMIA WITH GRANULOCYTE COLOY STIMULATING FACTOR MOBILIZED AUTOLOGOUS PERIPHERAL BLOOD MONOCLEAR CELLS

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Background: Although, critical limb ischemia (CLI) patients have been treated by surgical arterial bypass or endovascular treatment, 20% to 40% of patients with CLI could not be candidates for either of these approaches. These no-option CLI patients usually lost their limbs.

Objective: To study the efficacy and safety of granulocyte colony-stimulating factor (G-CSF) mobilized peripheral blood mononuclear cell (PB-MNC) in treatment of no-option CLI.

Methods: Ten patients with no-option CLI were treated with G-CSF 5-10 g/kg/day for 4-5 days. After white blood cell count reached 20,000-40,000/mm^3, PB-MNC was collected by blood cell separator. PB-MNC was injected to calf or thigh of ischemic limbs for 60-100 sites. Ankle brachial index, toe brachial index and transcutaneous

oxygen tension measurement was record at 1 and 3 months after injection. Amputation rate, wound healing rate and symptoms of patients were recorded.

Results: Ten no-option CLI patients age between 62 to 77 years were included. Sixty percent were female. The presenting symptoms were gangrene 40%, non-healing ulcer 40 % and rest pain 20%. Risk factors included diabetes mellitus 60%, hypertension 90%, dyslipidemia 90% and smoking 30%. CD34 positive cell per site of injection was range from 0.81 to 9.91 ± 106/ml. Only one (10%) patient undergone major amputation after injection. Other patients had symptom improvement including relieve of rest pain, healed wound and limb saving. However, 2 patients came to hospital again for recurrent of CLI symptoms. These 2 patients had been re-injection of PB-MNC. Both patients could save their limbs. None of patient had complication after PB-MNC injection.

Conclusion: G-CSF mobilized PB-MNC is safe and effective in treatment of no-option CLI.

PREDICTIVE SURGICAL OUTCOME OF EUROSCORE II FOR ACTIVE ENDOCARDITIS

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Background: The European System for Cardiac Operative Risk Evaluation II (EuroSCORE II) was developed from the original EuroSCORE (1999), to predict the mortality rate of patients undergoing cardiac surgery. EuroSCORE II underestimates post - cardiac surgery mortality in high risk patients. There are few studies of the association between EuroSCORE II and mortality rate of patients with active endocarditis.

Objective: Evaluate the accuracy of EuroSCORE II to predict in-hospital mortality and long term result in active IE patients

Material &Methods: A retrospective study was performed at Maharat Nakhon Ratchasima Hospital. Active endocarditis patients, aged 18 years or more, underwent cardiac surgery in the active phase during 2008 to 2017 were recruited to the study. Hospital mortality rate of the patients were compared of EuroSCORE II.

Results: From 121 patients undergoing cardiac surgery, 24 were dead, the mortality rate of 19.8%.The EuroSCORE II was classified into 5 rating scales, group I (score 0, < 10) death 7.1%, group II (score 10, < 20) death 32%, group III (score 20, < 30), death 29.4%, group IV (score 30, < 40) death 66.7% and group V (score ≥ 40) death 66.7% cut - off point was 12 and over. EuroSCORE II scores of 12 and above had a sensitivity of 40.9%, a specificity of 92.2%, a positive predictive value and negative predictive value of 75% and 73.2, respectively.

Conclusion: There was no association between EuroSCORE II and actual mortality rate particularly in severe cases. Therefore EuroSCORE II should be used with caution for making a decision for cardiac surgery especially in group with severe active Endocarditis (EuroSCORE II ≥ 12.0).

PREDICTORS OF POSTOPERATIVE ATRAIL FIBRILLATION AFTER OFF-PUMP CORONARY ARTERY BYPASS GRAFTING

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Background: Postoperative atrial fibrillation (AF) is one of the most common complications after cardiac surgery and associated with other major complications such as stroke, ventricular arrhythmia and hemodynamic compromised. Off-pump Coronary Artery Bypass Grafting (OPCAB) compared with conventional coronary bypass grafting may improve short-term outcomes (stroke, renal dysfunction, blood transfusion, respiratory failure, atrial fibrillation, wound infection, ventilation time, and length of stay) however incidence of AF is still high.

Objective: The objective of this study is to identify predicting factors of postoperative AF after OPCAB.

Materials and Methods: Between January 2001 and December 2017, 1879 consecutive patients underwent OPCAB. Mean age was 63.0 ± 10.4 years and 79.4% were male. Mean body mass index was 25.8 ± 4.0. The incidence of considering factors was as follows: current smoking 14.3%, diabetes 48.9%, hypertension 73.4%, on renal dialysis 1.8%, heart failure 21.1%, cardiogenic shock 5.6%, recent myocardial infraction (MI) 13.8%, previous percutaneous coronary intervention 10.2%, and previous cardiac surgery 2.4%. The mean left ventricular ejection fraction was 54.8 ± 15.2%. Significant left main disease (≥ 50% stenosis) was found in 34.7%. The last preoperative serum creatinine was 1.2 ± 0.8 mg/dl. Perioperative intraaortic balloon pump was used in 16.3%. All of the measured variables were subjected to univariate and, consecutively, to multivariate logistic regression analysis to determine predictors of postoperative AF.

Results: The postoperative AF was found in 23.5%. The predictors of postoperative AF were age ($p < 0.001$), recent MI ($p = 0.006$), heart failure ($p = 0.039$) and Cardiogenic shock ($p = 0.044$).

Conclusions: Age, recent MI, heart failure and cardiogenic shock were independent predictors for postoperative AF after OPCAB. Chemoprophylaxis with Beta-receptor antagonists in elderly or amiodarone in patient with recent MI, heart failure and cardiogenic shock may effective against the development of postoperative AF in OPCAB. Randomized controlled trials are warranted.

PREOPERATIVE CLINICOBIOLOGICAL SEVERITY OF SECONDARY HYPERPARATHYROIDISM PATIENTS IN THAMMASAT UNIVERSITY HOSPITAL

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Background: Although the initial and predominant management of hyperparathyroidism in ESRD is medical therapy, there are approximately 10 percent of patients developed refractory hyperparathyroidism that cannot be controlled to acceptable levels by medical therapy. Those patients ultimately require surgery to correct ESRD-related hyperparathyroidism. We assessed preoperative clinicobiological severity of secondary hyperparathyroidism patients in Thammasat university hospital compared to the standard recommendation.

Methods: We conducted retrospective review data for 3 years (January 2015 to April 2018) from outpatient department cards of Thammasat university hospital which collected data from whole entire department in the hospital that deserved for surgical parathyroidectomy. We reported categorical data as percent (%) and continuous data as mean and median.

Results: This study included 40 patients with secondary hyperparathyroidism in Thammasat University Hospital. There were 42.5% of male and 57.5% of female. The median age is 46 years. Mean of duration of hemodialysis were 7 years before parathyroidectomy. 97.5% had PTH level more than 1000. Mean of serum PTH level , serum corrected calcium level, serum phosphate level, and serum calcium phosphate product were 2002.97 pg/ml, 10.03mg/dL, 6.64 mg/dL, and 66.60 respectively. Only 19 patients (45%) were work up BMD and showed osteoporosis 17.5%, specific symptom (fracture/deformity) 5%.

Conclusions: The secondary hyperparathyroidism patient who failed medication in Thammasat University hospital was parathyroidectomy later than standard recommendation.

PULMONARY EMBOLISM IN THE POSTOPERATIVE GENERAL SURGERY PATIENT AT SRINAGARIND HOSPITAL

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Objective: Pulmonary embolism has historically been perceived to be a rare disorder in Asia. New evidence has emerged recently that contradicts this perception. The aim of this study was to examine the incidence of acute pulmonary embolism and its outcome in the postoperative general surgery patient at Srinagarind Hospital.

Materials and Methods: A medical chart review of patients who were diagnosed with acute pulmonary embolism (PE) in the postoperative period during 2007 to 2015 was done.

Results: The incidence of acute PE in the postoperative surgical patient rose from 3.7 in 10,000 to 20.5 per 10,000 in 9 years, The average age of these patients was 57.6 years; the average BMI was 23.4; 25% has history of DVT; 75% has malignant diseases, 86% had clinical and other evidence of PE. Only 7% received preoperative mechanical prophylaxis is for PE.

Conclusions: The incidence of PE is not low as previously believed, and it is on the rise. Postoperative PE has a mortality rate of 38%. The use of preoperative thromboembolic prophylaxis is still low.

REMISSION OF TYPE 2 DIABETES MELLITUS IN BARIATRIC-METABOLIC SURGERY AND PREDICTORS OF FAILURE OF REMISSION

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Objectives: The aim of the study was to evaluate the outcomes of morbidly obese patients with type 2 diabetes mellitus (DM) managed by laparoscopic Roux-en-Y gastric bypass surgery and laparoscopic sleeve gastrectomy.

Methods: The present study was a single-institution cohort study. There were 37 morbidly obese patients with type 2 diabetes mellitus undergoing bariatric metabolic surgery between January 2013 and January 2018. The average follow-up time was 25 months. The primary outcome was DM remission. Potential prognostic factors for failure

of DM remission including weight loss, FBS, HbA1c level, lipid profile, serum creatinine, and use of anti-diabetic medications were examined.

Results: Patient, undergoing bariatric-metabolic surgery, complete remission of DM occurred in 62% (23/37), and partial remission in 24 (9/37), with some improvement in 3% (1/37). Relapse of DM occurred in 1 patient. Average percentage of estimated weight loss was 28%. HbA1C decreased on average from 7.5 to 5.6% ($p < 0.001$), FBS from 144.8 to 95.6 mg/dL ($p<0.001$). Predictors of failure of Dm remission included lower percentage of estimated weight loss ($p < 0.001$), and the use of insulin to control DM ($p = 0.001$).

Conclusions: After 2 years of follow-up, a large proportion of morbidly obese and diabetic patients who underwent bariatric-metabolic surgery had complete or partial remission of DM. There were also significant weight loss, reduction in HbA1c, and reduction in use of anti-diabetic medications. Patients who did not lose much weight or required insulin to control diabetes were more likely to fail to go into remission.

THE BENEFIT OF REPEAT FAST IN BLUNT ABDOMINAL TRAUMA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Focused Assessment Sonography for Trauma (FAST) has become commonplace in the management of blunt abdominal trauma. Small amount of intraabdominal bleeding may limit the sensitivity of FAST. However, if initial FAST is negative, intraabdominal bleeding cannot be excluded. It remains unclear whether to observe by clinical symptom or re-examine with imaging in patients with abdominal trauma. This meta-analysis studied the benefit of repeat ultrasound to detect abdominal injury.

Objectives: To evaluate the benefit of repeat FAST in blunt abdominal trauma patients.

Materials and Methods: The Ovid-MEDLINE and Scopus databases were thoroughly searched for studies evaluating the secondary/repeat ultrasound in blunt abdominal trauma patients. The inclusion criteria included; 1) Blunt abdominal trauma patients 2) Age ≥ 15 years old and 3) Perform repeat FAST. A meta-analysis and systemic review was conducted to evaluate the percentage of abdominal injury detection when repeat FAST was used. Rate of abdominal injury diagnosis with Computer tomography (CT) scan was also compared with the ultrasound.

Results: Five original studies with 2209 subjects were collected from the databases. The repeat FAST and CT scan increased positive injury detection rate when compared with initial ultrasound alone. Initial FAST had sensitivity, specificity, positive likelihood ratio and negative likelihood ratio 72%, (95% CI 0.43-0.90), 98% (95% CI 0.92-0.99), 29 (95% CI 9.1-92.7), 0.28 (95% CI 0.12-0.69), respectively, while repeat FAST had 90% (95% CI 0.72-0.97), 98% (95% CI 0.84-1.0), 41.1 (95% CI 5.5-312.7), 0.1 (95% CI 0.04-0.31), respectively. The appropriate timing for repeat FAST was inconclusive due to insufficient data for subgroup analysis. However, performing repeat FAST may help in case of inability to examine the patient with CT scan.

Conclusion: Performing repeat FAST in patients with blunt abdominal injury significantly increased sensitivity of abdominal injury detection, and it could be an option for patients who are not fit for the CT scan.

THE CORRELATION BETWEEN TUMOR REGRESSION GRADE AND THREE-YEAR DISEASE FREE SURVIVAL IN LOCALLY ADVANCED RECTAL CANCER AFTER PREOPERATIVE CHEMORADIATION FOLLOWED BY SURGERY

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Background: The colorectal malignancy is the fourth most common cancer and increases the mortality rate. Especially, in locally advanced rectal cancer (stage II and III) would have high local recurrence and decease overall survival (OS). The treatment of this group is preoperative chemoradiation (CRT) followed by surgery. In several studies showed the benefit of tumor regression grade (TRG) and pathological complete response (pCR) that related to local recurrence and overall survival. This study aimed to find the correlation between TRG and three-year disease free survival (DFS) in locally advanced rectal cancer after preoperative CRT followed by surgery.

Methods: The data were retrospectively collected from 83 locally advanced rectal cancer patients who received preoperative CRT at Songklanagarind Hospital from January 2010 to December 2014. All patients would receive preoperative CRT with 5FU-based chemotherapy regimen

and total dose of 45-50.4 Gy in 25 daily fractions of radiation and follow by surgery.The exclusion criteria compounded with patients who were younger than 18 years, advanced rectal cancer patients and patients who had other sites of malignancy. The TRG classification was used Mandard TRG system that had 5 levels. The TRG 1-2 patients were defined as the good response TRG. The TRG 3-5 patients were defined as the bad response TRG.

Results: Among 74 patients, the patients were divided into good response TRG (28.4%) and bad response TRG (71.4%). The 3-year DFS and 3-year OS did not have any significantly differences in both groups. The 6 patients (9%) had pCR. The down staging was 60.8% after preoperative chemoradiation. The male and preoperative CRT carcinoembryonic antigen (CEA) level > 5 ng/mL were the factors related to the TRG from multivariate analysis.

Conclusion: The TRG did not relate to 3-year DFS and 3-year OS in locally advanced rectal cancer patients who received preoperative CRT and followed by surgery. But the pCR had trend to relate to DFS in locally advanced rectal cancer patients. Male and pre-CRT CEA level related to TRG.

THE EFFECT OF LOBULAR BRANCH OF GREAT AURICULAR NERVE PRESERVING PAROTIDECTOMY ON FREY'S SYNDROME AND EAR LOBULE SENSATION

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Background: Traditional superficial parotidectomy as the treatment of parotid lesions often encountered numbness of ear lobule and Frey's syndrome. Many techniques had been described aiming to reduce those unfavorable consequence. This study sought to evaluate the effects of the lobular branch of great auricular nerve preserving parotidectomy on Frey's syndrome and ear lobule sensation.

Methods: 40 patients who presented with clinically benign parotid lesions and underwent SMAS preserved with or without lobular branch of great auricular nerve preserving superficial parotidectomy were enrolled in a descriptive retrospective study. Sensation of the ipsilateral ear lobule using light touch sensation technique and symptoms of Frey's syndrome were evaluated. Minor's starch iodine tests were also performed.

Results: The incidence of Frey's syndrome in the SMAS and lobular branch of great auricular nerve preserving parotidectomy is 21.9% (7/32) subjectively and 28.1% (9/32) objectively comparing to 66.7% (6/9) subjectively and 77.8% (7/9) objectively in the SMAS only preserving group. The sensation of the ear lobule is intact 78.1% (25/32) in the nerve sparing group comparing to 33.3% (3/9) in SMAS only preserving group.

Conclusion: This study showed that incidence of Frey's syndrome in the SMAS and lobular branch of great auricular nerve preserving parotidectomy is lower than the SMAS preserving only group. The sensation of the ear lobule is also much better in the nerve sparing group compare to the SMAS only preserving group.

THE EFFECTS OF WOUND PROTECTOR TO DECREASE THE SURGICAL SITE INFECTION IN OPEN ABDOMINAL SURGERY, DOUBLE-BLIND PROSPECTIVE RANDOMIZED CONTROLLED TRIALS

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Surgical site infection (SSI) is the most common cause of postoperative morbidity after the laparotomy. Many independent factors show to increase risk of SSI. Prevention of SSI is very important especially intraoperative period. The patients undergoing a standard midline laparotomy were prospectively randomized to use or not use a wound protector between September 2016 and January 2018. The 128 patients were eligible for the study. All demographic data and surgical variability of the 2 groups are no significantly difference. Preoperative and perioperative data, those can be risk factors for SSI, were collected for analysis. Wound protector was used in 64 patients (WP group) and was not used in 64 patients (Non-WP group). A patient in non-WP group dead from non-SSI related condition. Three patients (1 patient from non-WP and 2 patients from WP group) undergone re-operation before 30 days without any wound complication. Surgical site infection was occurred in 30 patients (24%), with significantly higher incidence in Non-WP group than WP group (17.7% vs. 6.5%, P-value 0.006). Multivariate analysis revealed that placement of a wound protector could decrease the incidence of SSI (odds ratios [OR] 0.269, 95% confidence interval [CI] 0.109-0.667). Many specific conditions that wound protector could prevent the SSI were found. We conclude that intraoperative wound protector placement is effective for decreasing the incidence of surgical site infection in the major laparotomy operation.

THE EFFICACY OF ARGON PLASMA COAGULATION COMBINED WITH MESALAZINE RECTAL SUPPOSITION COMPARED WITH ARGON PLASMA COAGULATION ALONE IN CHRONIC HEMORRHAGIC RADIATION PROCTITIS

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Background: Chronic hemorrhagic radiation proctitis is a common complication of pelvic radiation. Argon plasma coagulation (APC) is indicated in failed medical treatment patients. Mesalazine is used for prevent bleeding rectal ulcer after procedure.

Objective: This study aimed to review the efficacy of combination treatment of Argon plasma coagulation (APC) with mesalazine rectal supposition compared with APC alone in chronic hemorrhagic radiation proctitis patients.

Methods: All chronic hemorrhagic radiation proctitis patients who were treated with APC in Nanthana-Kriengkrai Chotiwattanaphan Institute of Gastroenterology and Hepatology, Songklanagarind hospital in 6 years period were retrospective reviewed and divided into two groups. We then compared the patient's characteristic, treatment and the outcomes of the two groups. The main outcome is rectal haemorrhage, assessed by improvement of hematocrit post- intervention within each group.

Results: A total of 20 patients were enrolled (APC alone n = 12, APC with mesalazine n = 8). All patients were female, with a mean age of 63.35 years and 95% having cervical cancer. There are no differences in the baseline hematocrit between the two groups (APC alone = 28.5%, APC with mesalazine = 26.5%, *p*-value = 0.553). There was no difference in medication usage. In the APC with mesalazine group there was a difference between baseline and post-intervention hematocrit (26.51% and 30.8%, *p*-value = 0.04) but no difference in the APC alone group (28.52% and 28.20%, *p*-value = 0.8). Post- intervention APC with mesalazine group had a 3.94% improvement of hematocrit while there was a 0.267% decrease in APC alone group (*p*-value=0.05). Mean followed-up hematocrit time difference (2.1 months in APC alone, 5 months in APC with mesalazine, *p*-value < 0.001).

Conclusion: APC coupled with mesalazine may have a greater efficacy than APC alone for the improvement of hematocrit and prolongation of mean followed-up hematocrit time reflective of improvement of recurrent bleeding and symptoms. A large RCT is needed to confirm the benefits of this combination treatment.

TOTAL CENTRAL VENOUS CATHETERIZATION DAYS UNTIL INFECTION IN THE NEONATAL INTENSIVE CARE UNIT IN HATYAI HOSPITAL

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Introduction: Central Venous Catheterization (CVC) is commonly used in nowadays in NICU for panenteral nutrition, venous access, and evaluation of fluid status. Due to CRBSI rate catheter are schedule to be removed within 14 day after insertion. This research is to study for how long catheter can be used until infection occurs.

Materials and Methods: We retrospectively reviewed all patients undergoing insertion of central venous catheterization in NICU in Hatyai hospital from October 2015 to August 2017 was performed. Variable of interest included demographics, anatomical site, hospital location, line days, line infection, Anesthesia used, and complications. Line infection was defined as a positive blood culture drawn through the catheter.

Results: Total 81 catheters were placed Majority of catheters 70 (86.4%) were placed in NICU at mean Gestational age of 34 ± 4.6 weeks. Right subclavian vein and left subclavian veins were most common anatomical sites 41 (50.6%) and 24 (29.6%) respectively. Two catheters were infected (2.5%). The rate of infection before 14 days were 5.05 events per 1000 catheter days (95% CI 0.61-18.24) and after 14 days were 0 per 1000 catheter days (95% CI 0-0.008) incidence rate difference 5.05 (95% CI -1.59-11.69) *p*-value 0.1365

Conclusion: NICU line infection rates decreased with implementation of CABSI prevention protocols in NICU of Hatyai hospital. There was no stratifical difference in infection rate before 14 days and after 14 days. As a result, Schedule to remove central venous catheter within 14 days were not needed in order to reduce infection rate.

TREATMENT OUTCOMES OF THE ADVANCED ENDOSCOPIC RESECTION FOR SMALL RECTAL NEUROENDOCRINE TUMOR

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Introduction: The European Neuroendocrine Tumor Society consensus guidelines for management of

colorectal neuroendocrine tumors (NETs) stated that rectal NETs less than 1 centimeter with no poor prognostic factors (G3, lymphovascular invasion, muscularis propria invasion) can be safely removed with advanced endoscopic techniques.However, there was no specific recommendation on the optimal endoscopic resection technique.

Aims: To report the therapeutic efficacy, safety and oncologic outcomes in each endoscopic resection techniques (endoscopic mucosal resection [EMR], precut EMR, endoscopic submucosal dissection [ESD]) for rectal NETs.

Methods: Between January 2013 and March 2018, 34 consecutive patients with rectal NETs were endoscopically resected by EMR, precut EMR or ESD. The method performed for endoscopic resection was based on the operator's discretion. The demographic, pathological data and clinical outcomes of the patients treated by each modality were prospectively collected and analyzed.

Results: Thirty-four patients were enrolled in this study. The EMR, precut EMR and ESD were performed in 12, 11 and 11 patients, respectively. The tumor in ESD group was significantly larger than the EMR and pre-cut EMR group. (ESD group 8.5 ± 2.1 mm, EMR 5.8 ± 2.8 mm, pre-cut EMR 6 ± 2.4 mm; $p = 0.02$). Complete resection rate for EMR, pre-cut EMR and ESD were 91.6%, 100% and 100%, respectively. There was no postoperative complication. Recurrence was not observed in the EMR, pre-cut EMR or ESD group. Median follow-up time was 14 months (range 1-50).

Conclusion: Advanced endoscopic resections EMR, pre-cut EMR or ESD are efficient and safe modalities for rectal NETs.

PAEDIATRIC SURGERY

ASSESSMENT OFCHILDREN WITH HIRSCHSPRUNG DISEASE POST DEFINITIVE SURGERY - ANORECTAL MANOMETRY AND FUNCTIONAL OUTCOMES

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Background: Hirschsprung disease is a common cause of intestinal obstruction among the neonatal population. Surgical procedures are the mainstay treatment and outcomes had been reported to vary according to institutions.

Objectives: To evaluate the results of anorectal manometry (RAIR-rectoanal inhibitory reflex and Anal Resting Pressure) and functional outcomes (PICSS), in children with Hirschsprung disease post definitive surgery.

Methods: Prospective cross sectional study involving children with Hirschsprung disease after definitive surgery in University Malaya Medical Centre (UMMC) and University Malaya Specialist Centre (UMSC). Children post surgery more than 6 months with no underlying post operative complications were recruited. Functional outcomes of their bowel continence will be evaluated by PICSS questionnaires, and anorectal manometry performed. Pearson's Chi square ($\gamma 2$) and Fisher's Exact test were used to determine the significance of RAIR and ARP in correlation with the PICSS, comparing groups of different surgeries. One-way Annova was used to demonstrate the significance of RAIR and ARP, correlating with the episodes of enterocolitis post corrective surgery.

Result: Total of 33 children was recruited. 13/33 (39.4%) patients have presence of RAIR in which 9 of them, who have RAIR underwent transanal pull-through procedure (TAPT). Duhamel surgery recorded absence of RAIR with 8/9 (89%). There was a significant difference of the RAIR result, comparing HD children who underwent Duhamel surgery and Non Duhamel surgery (p-value = 0.041). Normal ARP was recorded in 24 children (72.8%). Soave surgery has the highest mean anal resting pressure 101.7 ± 45.4 mmHg. Presence of RAIR does not promise good functional outcome on PICSS result (p-value = 0.191). This study reported presence of RAIR in HD children post surgery, 10/13 (76.9%) has normal continent, 23.2% of them has incontinence, and none of them were constipated. 10/19 (52.6%) who has absent RAIR, normal continence.

Conclusion: Absence of RAIR post surgery does not always result in constipation and incontinence. Transanal pull-through has demonstrated a better outcome in comparison to other procedures performed for children with HD at our centre. Anorectal manometry and PICSS can be recommended as adjunct to assess the trend of continence for children with Hirschsprung disease, after definitive surgery.

BACTERIOLOGICAL STUDY, CLINICAL APPRAISALS AND TREATMENT OF BCGOSIS IN THAILAND

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Background: Bacillus Calmette-Guerin (BCG) vaccine is the live attenuated vaccine derived from a virulent strain of Mycobacterium bovis. BCG related regional lymphadenitis, so called BCGosis is one of the common complications following BCG vaccination.

Objectives: The purpose of this research was to study the bacteriology of BCGosis focusing on the positive finding of Mycobacterium bovis. We also evaluated clinical presentation, investigations, treatment (both medical and surgical management) and outcomes of BCGosis.

Material and Methods: A retrospective review was performed of all BCGosis patients under 1 year of age who underwent surgical management at Division of Pediatric Surgery, Siriraj Hospital from 2006 to 2016. Descriptive statistics were used for analyzed this study.

Results: Thirty-six patients (21 boys and 15 girls) were reviewed. The most common location of BCGosis was left axilla (58.3%). Almost all patients underwent excision, there was only one patient underwent incision and drainage. AFB stains from pathologic and bacteriologic study were positive 33.3% and 2.8%, respectively. Pathologic examination showed caseous granulomatous inflammation in 41.7% of the patients. M. bovis was isolated from the culture of 13 patients (36.1%). The conventional PCR test for M. tuberculosis complex was performed in 33 patients and positive finding was 22.2%. No patients had surgical complications. Anti-tuberculosis drugs were given in 22 patients after the operation. 1-year recurrence free time of this study was 93.8%.

Conclusion: Although clinical features are imperative for making the diagnosis of BCGosis, investigations can help to confirm this. However, there are some limitations of the demonstrated investigations; further investigations are needed for identification of BCG among strains of the M. tuberculosis complex. Surgical excision is the mainstay of treatment for BCGosis with low recurrence rate. The role of anti-tuberculosis drugs is still unclear but believed to have benefit in case of positive M. bovis culture.

COMPLICATIONS OF SURGERY FOR SACROCOCCYGEAL TERATOMA IN CHILDREN

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Aim: To report our experience with complications of surgery for sacrococcygeal teratoma (SCT) in children.

Methods: Medical records of all children undergoing surgery for SCT at our center from January 2011 to December 2015 were reviewed.

Results: 32 patients were identified, 24 girls and 8 boys with a median age of 34 days (range 1 day to 7 years). Median size of the tumors was cm. (range). SCT type I, II, III, IV according to Altman classification were 53.1%, 37.5%, 6.3%, 3.1% respectively. Histology showed mature teratoma in 84.4%, immature in 12.5%, with malignant component in 3.1%. Tumor excision was performed by posterior sacral approach in 84.3%, abdominal - in 3.1% and combined abdominal-sacral approach in 12.5%. Intraoperative rectal injury occurred in 3.1% which was managed by rectal suture and colostomy. During postoperative period 6.3% patients suffered from urinary retention, treated by catheterization, 12.5% - wound infection. Median postoperative hospital stay was 7 days (range 3 - 37 days). At a median follow up 44.5 months, 12.5% patients suffered from urinary incontinence (half of them recovered 6-18 months after acupunture), 6.3% - constipation, 3.1 % - fecal soiling, Recurrence occurred in 6.3%. Overall survival was 100%.

Conclusions: Although overall survival after surgery for SCT in children is good, late complications of urination and defecation disorder can occur and long term follow up is mandatory. Some complications of urinary incontinence may recover after acupunture.

IMPACT OF SURGICAL MARGIN AND OTHER FACTORS ON OUTCOME OF HEPATOBLASTOMA PATIENTS

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Background and Purpose: About half of all hepatic

malignancies in children are hepatoblastoma. It is widely accepted that complete resection of tumor is necessary. For those whom resection is not possible, orthotopic liver transplant (OLT) has becoming a viable surgical option, but host short-and long-term complications. We hypothesize that favorable outcomes may be achieved no matter what the resection margins are, so other key structures could be easily avoided.

Methods: This is a retrospective study of hepatoblastoma patients who underwent liver resection between January 2004 and December 2015 at Siriraj hospital, Bangkok, Thailand. This consists of 29 patients' age less than 15 years old at the time of surgery. Outcomes were evaluated in death and recurrent rate. Factors that may have impact the outcome were included in the study such as AFP, PRETEXT, type of pathological tissue and lymphovascular invasion.

Results: After follow up, we found that 8 patients (28%) did recur, while 21 patients (72%) did not. 18 patients (86%) in the non-recurrence group and 6 patients (75%) in the recurrence group had free surgical margin. There was no statistical significance ($p = 0.6$). The only two factors that were statistically significant between the non-recurrence and recurrence group were metastasis and lymphovascular invasion.

Conclusion: According to our findings, there is no difference on recurrent rate no matter how much the surgical margin is. Thus surgeons could perform tumor resection despite of its closed proximity to other important structures. Two factors that play an important role in the recurrent rate of the hepatoblastoma are metastasis and lymphovascular invasion.

LONGGEVITY AND COMPLICATIONS OF TOTALLY IMPLANTABLE VENOUS ACCESS DEVICE (TIVAD) USED IN PEDIATRIC CANCER PATIENTS, EXPERIENCE FROM A UNIVERSITY HOSPITAL IN THAILAND

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Introduction: A TIVAD has gained more acceptances to be used for central venous access in pediatric patients who require long-term chemotherapy with an aim to avoid the problem of extravasation and improve quality of life.

Objectives: To appraise experience of the pediatric cancer center in a university hospital in Thailand regarding employment of this device.

Methods: Medical records of consecutive patient aged less than 15 years who were diagnosed of malignancy and underwent an implantation of TIVAD from the years 2010 to 2018 were review with main focuses on effective duration and complications of the device. Cases who were referred to other hospital or loss to follow-up after the procedure were excluded.

Results: A total of 138 lines in 132 patients (97 hematologic malignancies and 35 solid tumors) were included in the analysis. Average age of the patients was 6.2 years with 65 cases (47.1%) aged less than 5 years and 38 cases (27.5%) less than 3 years. Considering access sites, neck veins were used in 55 lines, subclavian veins in 82 lines and 1 femoral venous access. The only femoral line and 25 neck lines (45.4%) were approached by an open venesection. Median follow-up period was 508.5 days. Immediate complications occurred in 13 cases (9.4%), 4 of these required a surgical revision. Excluding cases with death from unrelated causes and those with immediate complications, overall TIVAD survival was 726.8 days when event-free device survival was 710.5 days. In cases with hematologic malignancies, 1000-day overall survival and problem-free survival of TIVAD were 82.2% and 75.5%, respectively. Catheter related infection and mechanical obstruction were 2 most prevalence problems occurring to the device, occurring in 0.2 and 0.04 events/1,000 catheter days, respectively. Subclavian access was significantly related with infectious complications when compared to neck vein approach (22.2% vs. 7.2%, p-value 0.02).

Conclusion: A majority of TIVAD can be implanted for pediatric chemotherapy longer than 3 years without serious complication. Refinement of surgical technics to reduce mechanical complications and improving care process to prevent catheter related infection may improve the longevity of the line.

MANAGEMENT OF INTUSSUSCEPTIONS IN OLDER CHILDREN

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Aim: To report our experience of management of intussusceptions in older children.

Methods: Retrospective study of all patients older than 24 months with intussusceptions treated at 2 centers between January 2015 and October 2017. Air enema reduction (AER) was performed first for patients without detected pathologic lead point (PLP). Surgery was indicated for cases with detected PLP and for cases after failed AER.

Results: 210 patients were enrolled in the study with

Table 1: Clinical presentation, PLP and treatment results

	Age group			
	24 months - 5 years (n=157)	**>5 year-old (n=53)**	**Total (n=210)**	***P***
Clinical presentations				
Periodic abdominal pain/crying	157	53	210	
	100%	100%	100%	
Vomiting	87	24	99	0.201
	55.4%	45.3%	47.1%	
Bloody stool	5	1	6	0.624
	3.2%	1.9%	2.9%	
Palpable abdominal mass	22	6	28	0.618
	14.0%	11.3%	13.3%	
PLP and treatment results				
Pathologic lead point	0	3,8	2	0.014
	0%	%	0.9%	
Successful air enema reduction	156	51	207	0.096
	99.4%	96.2%	98.6%	
Recurrence	28	1	29	0.004
	17.8%	1.9%	13.8%	

a median age of 34 months (range: 25months to 14 years): 157 patients aged 24 months to 5 years (group A) and 53 patients aged older than 5 years (group B). The common clinical presentations were abdominal pain 100%, vomiting 47.1%, 13.5% palpable mass, 2.9% bloody stool. Ultrasound showed typical target sign in all cases but no PLP was detected. AER was performed in all cases with 98.6% successful reduction rate and no complications or mortality. Among 3 patients underwent surgery for failed AER, 2 had PLP (0.9%). The rate of recurrent intussusceptions after AER was 13.8%. Clinical presentations, AER success rate were similar between group A and group B but PLP was more frequent (3.8% vs. 0%, $p = 0.014$) and recurrences were less in group B compared to group A (1.9% vs. 17.8%, $p = 0.004$).

Conclusions: Most of intussusceptions in children older than 24 months are without PLP and can be treated by AER with good results. Patients older than 5 year have significantly higher rate of PLP and less recurrence than patients 24 month- to 5 year-old.

MORBIDITY AND MORTALITY OF PATIENTSWITH CONGENITAL ABDOMINAL WALL DEFECTS (GASTROSCHSIS AND OMPHALOCELE) AT KCMH

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Background: Gastroschisis and omphalocele are the most common congenital abdominal wall defects. There is no standard management for these anomalies and patients may require long-term hospitalization.

Objectives: To study characteristic, mode of treatment, morbidity and mortality of patients with congenital abdominal wall defects.

Methods: It is retrospective study from medical record. We collected data of patients with congenital abdominal wall defect in King Chulalongkorn Memorial Hospital from 2005 to 2015.

Result: There were 111 infants with abdominal wall defect - 78 gastroschisis, 33 omphalocele. Infants were born to mother younger than 20 years old 42.31% in gastroschisis and 0.06% in omphalocele. Most common associated anomalies are congenital heart disease (14.1% in gastroschisis and 48.5% in omphalocele). Most of our cases were treated successfully with primary closure (60.3%). Most common complications are sepsis in gastroschisis (48.7%) and surgical site infection in omphalocele (48.5%). Mortality rate were 7.7% in gastroschisis and 18.2% in omphalocele.

Conclusion: Gastroschisis was more common but had a lower associated anomalies, lower morbidity and low mortality rate comparing with Omphalocele. Infants with gastroschisis were associated with young maternal age. Most of cases were treated with primary abdominal closure. Median duration from surgery to enteral feeding and duration of hospital stay are indifferent among group.

PREDICTIVE FACTORS FOR PATHOLOGICALPERIPHERAL LYMPHADENOPATHY FROM SURGICAL BIOPSY IN CHILDREN

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Background: Peripheral lymphadenopathy is a common problem in children. While most of them are self-limiting; some enlarged lymph nodes require surgical biopsy to determine their etiologies and proper treatments.

Objectives: This study is aimed to identify clinical factors that can help surgeons to identify lymphadenopathy that are more likely to be pathological and be able to prevent unnecessary operations.

Material and Methods: A retrospective chart review was conducted in children with peripheral lymphadenopathy who underwent surgical biopsy in Division of Pediatric Surgery, Siriraj Hospital from January 2012 to December 2017. Baseline demographics, associated symptoms, duration of lymphadenopathy, lymph node characteristics, recent antibiotic therapy, blood tests, chest radiography, and pathological reports were obtained and analyzed.

Result: Surgical biopsy was performed in 98 children. Reactive hyperplasia was found in 49 cases (50%). Forty-nine pathological lymphadenopathies were identified, including TB lymphadenitis (38.8%), malignancy (30.6%), and other infectious lymphadenopathies (30.6%). Pathological lymphadenopathy was significantly associated with: age < 2 years (OR 4.0, 95% CI: 1.3, 12.6) or age > 10 years (OR 7.6, 95% CI: 2.6, 22.3), diameter > 2 cm (OR 6.3, 95% CI: 2.5, 16.2) especially those who progress within 4 weeks (OR 8.4, 95% CI: 1.7, 42.3), fixation to adjacent tissue (OR 7.6, 95% CI: 1.6, 36.2), leukopenia (OR 6.9, 95% CI: 1.4, 34.4), and leukocytosis (OR 4.6, 95% CI: 1.4, 15.7).

Conclusion: Pathological lymphadenopathy should be suspected in specific age groups, rapid enlargement, fixation to adjacent tissues, and abnormal WBC. Carefully history taking, physical examination and basic blood tests could avoid unnecessary surgical tissue sampling.

SURGICAL SITE INFECTION AFTER COLOSTOMY CLOSURE IN HIRSCHSPRUNG DISEASE AND ANORECTAL MALFORMATION: SINGLE-DOSE VS. MULTIPLE-DOSE PROPHYLACTIC ANTIBIOTICS

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Introduction: There is no consensus on the use of antibiotic prophylaxis for colostomy closure in the paediatric population.

Objective: This study aimed to assess the efficacy of single-dose antibiotic prophylaxis in the prevention of surgical site infection (SSI) after colostomy closure in children with Hirschsprung disease (HD) and anorectal malformation (ARM).

Methods: All children, with HD & ARM, aged 12 years and below, with colostomy closure between June 2012 and October 2015 were recruited. Single-dose antibiotic prophylaxis consisting of intravenous Cefotaxime and Metronidazole, was administered for "prospective group" during induction of anaesthesia, between March 2014 and October 2015. Patients administered multiple-dose antibiotics (intravenous Cefotaxime and Metronidazole during induction of anaesthesia and were continued up to 24 hours post-operatively), from June 2012 until February 2014, were considered as the "historical group". Demographic data, types of stoma, operative variables and complications were recorded. Primary outcome measured was SSI. A $p < 0.05$ was considered statistically significant.

Results: A total of 103 patients were recruited, with 53 (HD = 3, ARM = 50) patients in the historical group and 50 (HD = 4, ARM = 46) patients in the prospective group. The number of cases for HD and ARM, demographic distribution, types of colostomy and duration of surgery were fairly similar in both groups. There were 33 male and 20 female in historical group with mean age of 7.9 months (range 6.8 - 16.3 months). Among the 50 patients in prospective group, 34 were male and 16 were female. They had a mean age of 8.8 months (range 7.9 - 20.5 months). Double barrel colostomy in historical group and prospective group were 33 and 32, whereby loop colostomy were 20 and

18, respectively. Both groups had a mean duration of surgery of around 90 minutes. There were 5 (9.4%) cases of SSI in historical group and 2 (4%) cases in prospective group, with $p=0.438$. Statistical significance in cost reduction by administration of single-dose antibiotic was obtained ($p < 0.001$).

Conclusion: Single-dose antibiotic prophylaxis in colostomy closure has not caused an increase in SSI, as compared with multiple-dose antibiotics. It was cost-effective in the prevention of SSI in children undergoing colostomy closure for HD and ARM.

THE CORRELATION BETWEEN FUNCTIONAL OUTCOMES REGARDING BOWEL MOVEMENT CONTROL AFTER SURGICAL TREATMENTS AND THE QUALITY OFLIFE IN THAILAND ANORECTAL MALFORMATION PATIENTS

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Background: The ideal goal of surgical correction in Anorectal Malformation (ARM) patients is achieving normal functional outcomes, which leads to improved quality of life (QoL). Several bowel function assessment tools were proposed to evaluate these patients. However, the relationship between functional outcomes and QoL still lacks.

Objectives: The aim of this study is to evaluate an association between functional outcomes regarding bowel movement control after surgical treatment and QoL among ARM patients.

Methods: ARM patients aged 6 - 15 years and their parents were interviewed to collect information regarding their bowel functions and QoL after surgery. The patients who had comorbidities such as Down syndrome, mental retardation, neurologic disorders were excluded. Bowel functions was assessed in six domains: continence, feeling of urge to defecate, frequency of defecation, soiling, constipation, and smell using a scale modified from Rintala and Lindel's Bowel function score and Krickenbeck's Assessment of outcomes. The quality of life (QoL) was assessed in five domains: physical, mental, social, learning, and holistic view of life using a validated Thai Quality of Life Instrument for Children (ThQLC) scale. The correlation between bowel functional scale and QoL was evaluated with Pearson correlation under the assumption of Type I error of 0.05.

Results: Thirty-three cases of ARM with an average age of 10 year-old were included. The most common procedure was posterior sagittal anorectoplasty (PSARP) (46%), followed by anoplasty (27%). The Cronbach's Alpha for the functional scale and ThQLC were 0.78 and 0.90, respectively. There was no significant correlation between overall functional score and ThQLC. However, there is a significant association between functional score in term of smell and ThQLC ($r = -0.43$, $p = 0.01$). Analyses of QoL subdomains revealed additional relationships between soiling and holistic view of life QoL ($r = -0.47$, $p < 0.01$) and between smell and social QoL ($r = -0.47$, $p < 0.01$).

Conclusion: Overall functional outcomes for bowel movement control after repair of ARM is not correlated with QoL. However, functional score in term of soiling and smell significantly associates to QoL. Intervention reducing soiling and resultant smell can potentially improve QoL.

THE FACTORS AFFECTING THE PRESENCE OF ESOPHAGEAL VARICES IN BILIARY ATRESIA PATIENTS AFTER KASAI OPERATION

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Background: Biliary atresia (BA) is a common etiology of portal hypertension and cirrhosis in children. Despite of portoenterostomy, liver scarring may still in progress. Later on, variceal bleeding leads patients to catastrophic outcomes. Primary prophylaxis plays an important role to improve survival. However, there is no validated protocol for first surveillance esophagogastroduodenoscopy (EGD) in these patients.

Objectives: To identify the factors which relate to esophageal varices (EV) discover by the first esophagogastroduodenoscopy after Kasai operation.

Method: A retrospective chart review of post-surgical correction of biliary atresia patients who underwent EGD in Siriraj Hospital between January 2005 and December 2016. Baseline characteristics, age at operation, blood tests at 3 and 6 months on follow up, age at EGD, and analyzed to evaluate correlation.

Results: We found 80 patients of BA who underwent KPE. 56 patients were included in this study, which was 10 month-old to 5-year-old. EV was found in 21 patients

(37.5%). Surveillance EGD was initiated in 19 children, while endoscopic variceal bleeding control was indicated in only 2 patients. There was no complication related to endoscopic procedure. Comparing between variceal group and non-variceal group, age at KPE more than 90 days, anemia, presence of cholangitits, serum bilirubin and serum albumin level were statistically significant different.

Conclusions: EV is common in BA patients, especially those who have older age at Kasai operation, anemia, presence of cholangitis, and abnormal liver function tests. Early endoscopy may be beneficial in selected high-risk patients.

WATCH! IT IS NOT HAEMANGIOMA!

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Background: Haemangioma is the most common benign tumour in infancy and childhood with prevalence of about 4% in children. This benign vascular tumour does not require any surgical intervention or even medical treatment in most cases. It involutes with time, except in Non-Involuting Congenital Haemangioma (NICH). Hence it is sometimes overlooked, leading to a delay in diagnosis of malignant tumours which may have similar presentation.

Case Presentations:

First case: A 2-month-old boy came with upper lip swelling (3x2cm) which was noticed since 2 weeks of life and gradually increasing in size. He was initially diagnosed to have infantile haemangioma and commenced on Propanolol. Ultrasonographic findings raised the suspicion of soft tissue tumour and proceeded with MRI of the face and brain. A large supratentorial mass was seen in left basal ganglia obstructing the left foramen of Monroe and causing marked midline shift. With the presence of pedunculated lip mass, these findings may represent atypical rhabdoid tumour (ATRT). Lip mass was excised and histopathological examination confirmed the diagnosis of malignant rhabdoid tumour. Child received palliative care following the excision. Tumour over the upper lip regrew aggressively (8×7cm) within a month time with active bleeding. Unfortunately, child succumbed to the disease after the palliative surgery, due to increased intracranial pressure secondary to the brain metastasis.

Second case: A 6-month-old boy has been followed up for liver haemangioma since neonatal period. Serial ultrasounds were done and showed features consistent of liver haemangioma with no change in its size and sonographic appearance. Child was thriving well with no signs of high cardiac output failure. At six months old, his serum alpha feto-protein remained more than 20,000ng/ml and a CECT abdomen was performed. Tumour bleeding ensued and required an emergency extended right hepatectomy. Histopathological examination showed features of hepatoblastoma. Chemotherapy was commenced after the surgery.

Discussion: Haemangioma is common. Nonetheless, the possibilities of malignant tumour should be considered when it does not follow the nature of its disease.

เรียน หัวหน้ากองบรรณาธิการวารสาร The Thai Journal of Surgery

เนื่องจากมีข้อผิดพลาดของเจ้าหน้าที่ในการตรวจสอบบทความก่อนส่งตีพิมพ์ ทำให้มีความผิดพลาดในบทความ Severe Anaphylaxis Associated with Isosulfan Blue Injection Used for Sentinel Node Detection: A First Case Report in Thai Breast Cancer Patient ที่ตีพิมพ์ในวารสาร The Thai Journal of Surgery April - June 2018 จึงขอให้ตีพิมพ์ข้อความแสดงความผิดพลาดในวารสาร The Thai Journal of Surgery ฉบับต่อไปดังนี้

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ขอแก้ไขเป็น

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ขอแก้ไขเป็น

ชยนุช โอเจริญรัตน์

จึงเรียนมาเพื่อโปรดพิจารณาและดำเนินการต่อไป

อาจารย์ ดร.นายแพทย์ ดุลพัฒน์ สงวนรักษา

เรียน ท่านสมาชิกราชวิทยาลัยศัลยแพทย์แห่งประเทศไทยฯ

เพื่อเตรียมการให้ "The Thai Journal of Surgery" เป็นวารสารอีเลกทรอนิกส์ (e-Journal) อย่างเต็มรูปแบบในอนาคต อันจะรวมไปถึงการลดจำนวนวารสารฉบับพิมพ์ (Printed-paper edition) หรือ "Hard copy" ซึ่งจะลดค่าใช้จ่ายที่เกี่ยวข้องกับวารสารได้มากพอสมควร และทำให้วารสารยังคงอยู่กับสมาชิกราชวิทยาลัยฯ ได้อย่างต่อเนื่อง ดังนั้น จึงขอความร่วมมือให้สมาชิกที่ต้องการจะรับวารสารฉบับพิมพ์ กรุณากรอกข้อมูลในแบบตอบรับนี้ให้ครบ และส่งคืนมายัง **"ราชวิทยาลัยศัลยแพทย์แห่งประเทศไทย Royal College of Surgeons of Thailand อาคารเฉลิมพระบารมี 50 ปี เลขที่ 2 ซอยศูนย์วิจัย ถนนเพชรบุรีตัดใหม่ กรุงเทพฯ 10310"** หรือแสกนแบบตอบรับนี้ ส่งมายัง **e-mail thaisurgeon@gmail.com** ทั้งนี้ หากท่านไม่ส่งแบบตอบรับ หรือกรอกข้อมูลไม่ครบ ก็จะถือว่าท่านไม่ต้องการรับวารสารฉบับพิมพ์อีกต่อไป อนึ่งท่านสมาชิกฯ ยังสามารถอ่านและดาว์นโหลด บทความทุกบทความในวารสาร ผ่านเวบไซต์ของวารสารที่ลิงค์กับเวบไซต์ของราชวิทยาลัยฯ เหมือนเดิม

ขอแสดงความนับถือ

คณะบรรณาธิการ

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(ลงชื่อ)