Selective Non-Operative Management of Abdominal Gunshot Wounds: A Predictor for Therapeutic Laparotomy

Supparerk Prichayudh MD*, Krerkrit Suksatian MD*, Suvit Sriussadaporn MD*, Rattaplee Pak-art MD*, Sukanya Sriussadaporn MD*, Kritaya Kritayakirana MD*, Pasurachate Samorn MD*, Natawat Narueponjirakul MD*

* Department of Surgery, Faculty of Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok Thailand

Background: *Selective non-operative management (SNOM) has been well accepted in abdominal gunshot wound (AGW) patients. Since there is no uniform consensus regarding the criteria for SNOM, outcomes varied among institutions.*

Objective: *To examine the outcomes of SNOM in AGW patients at our institution and to identify the predictor for therapeutic laparotomy.*

Material and Method: *A retrospective study was performed on AGW patients between January 2004 and December 2014. Laparotomy was done in patients with 1) shock and/or peritonitis, 2) gastrointestinal (GI) bleeding, and 3) suspected peritoneal penetration (PP), with an exception of isolated right upper quadrant/right thoracoabdominal (RUQ/RTA) gunshot wound. SNOM was attempted in 1) patients with no PP (tangential AGW), and 2) stable patients with RUQ/RTA gunshot wound. Outcomes in terms of mortality and non-therapeutic laparotomy rate were analyzed. Stepwise logistic regression of the emergency department parameters was performed to identify predictors for therapeutic laparotomy.*

Results: *Eighty AGW patients were included in the present study. Forty-seven patients underwent immediate operation (32 shock/peritonitis, one rectal bleeding, and 14 PP), 46 had a therapeutic laparotomy. SNOM was attempted in 28 tangential AGW patients (all successful), four stable RUQ/RTA gunshot wound patients (one failure due to continued bleeding), and one patient with delayed presentation (successful). Overall, a successful SNOM was carried out in 32 patients (40%), the non-therapeutic laparotomy rate was 2%, and the mortality rate was 8%. The only predictor for therapeutic laparotomy identified in the present study was a positive focused assessment with sonography for trauma (FAST) result (odds ratio 51.2, 95% CI 6.3 to 414.9, p<0.001).*

Conclusion: *SNOM can be performed safely in patients with tangential AGW and stable isolated RUQ/RTA gunshot wound patients. FAST may be helpful in predicting a therapeutic laparotomy in AGW patients.*

Keywords: *Abdominal gunshot wounds, Selective non-operative management, Predictor for therapeutic laparotomy, FAST*

J Med Assoc Thai 2017; 100 (10): 1088-94
Website: http://www.jmatonline.com

Unlike abdominal stab wound, patients with abdominal gunshot wound (AGW) have a higher chance of having significant injuries requiring laparotomy (86 to 88%)[1,2]. Hence, mandatory laparotomy for AGW was proposed as a standard treatment[1,2]. However, recent studies have shown that a significant proportion of the AGW patients could be safely managed non-operatively (20 to 46%)[3-10]. Furthermore, negative laparotomy for trauma causes an increase in morbidity, mortality, length of hospital stays, and cost of treatment[11,12]. Therefore, the management of AGW patients has been shifted to selective non-operative management (SNOM). The presence of shock and peritonitis have been well accepted as an exclusion criterion for SNOM[3-10]. However, the significance of the location of the AGW in SNOM remains controversial since some studies suggested that SNOM should be reserved only for an isolated right upper quadrant/right thoracoabdominal (RUQ/RTA) gunshot wound[13-15], while other investigators advocated that SNOM could be performed safely regardless of the site of the wounds[5-10]. Moreover, there is still little information regarding the predictor for therapeutic laparotomy in AGW patients[7,16]. In the present study, the authors examined the outcomes of SNOM of AGW patients in our institution where SNOM was reserved for tangential AGW and stable RUQ/RTA gunshot wound patients. Additionally, we evaluated emergency department (ED) parameters to identify predictors for therapeutic laparotomy.

Correspondence to:

Prichayudh S; Department of Surgery, Faculty of Medicine, Faculty of Medicine, King Chulalongkorn Memorial Hospital, Chulalongkorn University, Rama IV Road, Bangkok, 10330, Thailand.
Phone: +66-2-2564117, Fax: +66-2-2564194
E-mail: Supparerk.P@Chula.ac.th

Material and Method

The authors conducted a retrospective study on patients with AGW at King Chulalongkorn Memorial Hospital, a 1,400-bed university hospital and a level 1 trauma center in Bangkok, Thailand, between January and December 2014. The study was approved by our Institutional Review Board. AGW was defined as any gunshot wound that appeared between the nipple line and inguinal skin creases anteriorly, and between tips of scapulae and gluteal folds posteriorly. Patients with 1) shock (systolic blood pressure less than 90 mmHg not responding to an initial fluid resuscitation), 2) generalized peritonitis, and 3) gastrointestinal (GI) bleeding were taken immediately to the operating room for exploratory laparotomy. Stable AGW patients (without shock, peritonitis, and GI bleeding) were evaluated for the presence of peritoneal penetration (PP) using clinical examination and/or plain X-ray. Computed tomography (CT) was done selectively in stable patients with questionable PP and an isolated RUQ/RTA gunshot wound. Stable patients with AGW in other location besides RUQ/RTA who had a positive PP would also undergo exploratory laparotomy. SNOM was performed in stable patients with 1) no PP (tangential AGW), and 2) RUQ/RTA gunshot wound with isolated solid organ injury demonstrated by CT. SNOM protocol in the authors' institution comprised 1) close monitoring of vital signs, 2) serial hematocrit obtained every four hours, and 3) serial abdominal examination performed by the same physician every four hours.

Data collection included demographic data, ED parameters (vital signs, trauma scores, and hematocrit), focused assessment with sonography for trauma (FAST) results, details of AGW, types of management, and outcomes in terms of blood component transfusions, complications, ventilator days, length of stay, non-therapeutic laparotomy rate, and mortality. Statistical analysis was performed by the Window SPSS program version 17.0 with the statistical significance set at *p*-value less than 0.05. Univariable analysis was done with the Chi-squared test for comparison of categorical variables, and the Student's t-test for comparison of continuous variables. The non-parametric (Mann-Whitney U) test was used for comparison of variables that were clearly non-normally distributed (i.e., blood transfusion, ventilator days, and length of stay). Multivariable analysis for the mutually independent predictor for therapeutic laparotomy was done by a stepwise logistic regression.

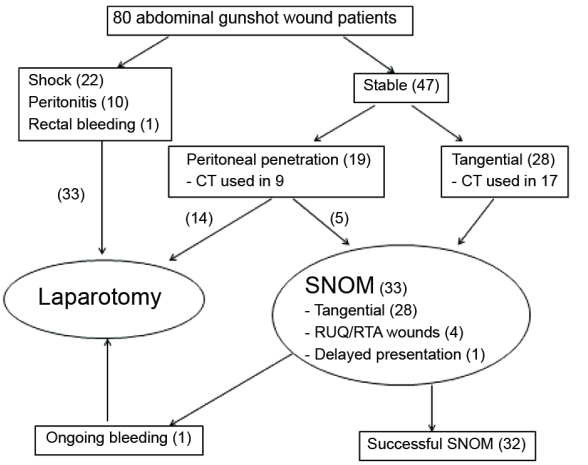

Fig. 1 Management of abdominal gunshot wound patients (CT: computed tomography, SNOM: selective non-operative management, RUQ/RTA: right upper quadrant/right thoracoabdominal).

Results

There were 80 AGW patients included in the present study (74 males and six females, with the mean age of 27 years). Handgun was the most common weapon responsible (85%), followed by shotgun (15%). The management of AGW patients were summarized in Fig. 1. Twenty-two patients with shock, 10 patients with generalized peritonitis, and one patient with rectal bleeding were immediately taken to the operating room for exploratory laparotomy, all had therapeutic laparotomy. The other 47 stable patients were evaluated for PP using physical examination and/or plain X-ray. CT was selectively used to determine PP in 22 patients with questionable PP and four patients with isolated RUQ/RTA gunshot wound. SNOM was carried out in 28 patients with tangential AGW (all successful) and four RUQ/RTA gunshot wound patients (three successful). In addition, a stable left lower quadrant AGW patient, transferred to our institution three days after the gunshot, underwent a successful SNOM albeit PP demonstrated by CT since the patient remained stable with no peritoneal signs. The remaining 14 stable patients with AGW in other location besides RUQ/RTA who had positive PP underwent laparotomy; only one had non-therapeutic laparotomy (a small colonic serosal tear). The demographic data and ED parameters were shown in Table 1. The FAST results were available in 72 patients, eight unknown results were in the immediate laparotomy group. The distribution of organ injuries is shown in Table 2. The most common injured abdominal organ was GI tract (49%), followed by liver (19%), and abdominal vessels (16%).

Of the 33 patients that underwent SNOM, 32 had a successful SNOM while one patient with RTA gunshot wound and right kidney injury required laparotomy 24 hours later due to ongoing hemorrhage. Four patients had spinal cord injury, one was operated on because of shock while the other three with tangential

Table 1. Demographic data and emergency department (ED) parameters

	Total (80)	Immediate laparotomy (47)	SNOM (33)	*p*-value
Sex, n (%)				1
Male	74 (93)	43 (91)	31 (94)	
Female	6 (7)	4 (9)	2 (6)	
Age, mean (SD)	27.0 (9.7)	28.0 (10.4)	25.0 (8.3)	0.101
BMI, mean (SD)	23.5 (4.1)	23.0 (3.9)	25.0 (4.6)	0.146
Mechanism, n (%)				0.324
Gunshot	68 (85)	42 (89)	26 (79)	
Shotgun	12 (15)	5 (11)	7 (21)	
Location, n (%)				
Anterior	35 (44)	23 (49)	12 (36)	0.374
Posterior	22 (27)	7 (15)	15 (46)	0.005*
Combined	11 (14)	10 (21)	1 (3)	0.036*
Thoracoabdomen	12 (15)	7 (15)	5 (15)	0.324
Positive FAST, n (%)	25 (31)	24 (51)	1 (3)	<0.001*
Unknown result	8 (10)	8 (17)	0	
ED parameters, mean (SD)				
SBP	115.0 (37.3)	106.0 (40.7)	130.0 (19.4)	0.003*
PR	101.0 (27.6)	107.0 (31.7)	93.0 (17.9)	0.027*
GCS	14.0 (3.1)	13.0 (3.6)	15.0 (0)	0.010*
ISS	14.0 (10.9)	19.0 (10.2)	6.0 (5.8)	<0.001*
RTS	7.34 (1.45)	6.99 (1.82)	7.84 (0)	0.009*
TRISS	93.4 (17.7)	89.5 (22.4)	99.1 (4.8)	0.016*
Hematocrit	36.5 (9.4)	33.7 (10.8)	40.2 (5.4)	0.002*

SNOM = selective non-operative management; BMI = body mass index; FAST = focused assessment with sonography for trauma; SBP = systolic blood pressure; PR = pulse rate; GCS = Glasgow Coma Scale; ISS = Injury Severity Score; RTS = Revised Trauma Score; TRISS = Trauma and Injury Severity Score; SD = standard deviation

* To highlight the significant values ($p<0.05$)

Table 2. Distribution of organ injuries

	Total (80)	Immediate laparotomy (47)	SNOM (33)	*p*-value
Head and neck, n (%)	5 (6)	2 (4)	3 (9)	0.670
Chest, n (%)				
Heart	1 (1)	1 (2)	0	1
Lungs	6 (8)	6 (13)	0	0.071
Abdomen, n (%)				
Intraabdominal organ injuries	51 (64)	47 (100)	4 (12)	<0.001*
Liver	15 (19)	12 (26)	3 (9)	
Spleen	2 (3)	2 (4)	0	
Kidney	6 (8)	5 (11)	1 (3)	
Diaphragm	9 (11)	9 (19)	0	
Pancreas	1 (1)	1 (2)	0	
GI tract	39 (49)	39 (83)	0	
Vascular	13 (16)	13 (28)	0	
Bladder	3 (4)	3 (6)	0	
Uterus	1 (1)	1 (2)	0	
Spinal cord, n (%)	4 (5)	1 (2)	3 (9)	0.376
Extremity and pelvis, n (%)	12 (15)	5 (11)	7 (21)	0.324

SNOM = selective non-operative management; GI tract = gastrointestinal tract

* To highlight the significant values ($p<0.05$)

AGW underwent successful SNOM (Table 2). Overall, a successful SNOM could be carried out in 40% of all AGW patients, and successful SNOM rate was 97% in the patients that underwent SNOM.

Of the 47 patients undergoing immediate laparotomy, 11 patients needed abdominal packing with temporary abdominal closure (damage control surgery), all subsequently received abdominal closure (seven delayed fascial closures and four planned ventral hernias) and survived. Seven patients required concurrent thoracotomy (massive intrathoracic bleeding in six and ED thoracotomy in one). The non-therapeutic laparotomy rate was 2% (one of 47 patients undergoing immediate laparotomy). Six patients in the immediate laparotomy group died from exsanguinations (one intrathoracic bleeding and five intraabdominal bleeding), resulting in the mortality rate of 8%. The outcomes of AGW patients are shown in Table 3.

The univariable analysis of the ED parameters showed that patients who had therapeutic laparotomy had more anterior AGWs, more positive FAST results (for hemoperitoneum), lower systolic blood pressure, lower GCS, lower Revised Trauma Score (RTS), and lower hematocrit level than those who did not have therapeutic laparotomy (Table 4). Nevertheless, the multivariable analysis demonstrated that the only mutually independent predictor for therapeutic laparotomy was a positive FAST result (p<0.001, OR 51.2, Table 5). There were 15 patients who had false negative FAST results (false negative 31.9%), all were in the immediate laparotomy group. The only patient with a false positive FAST result was a 36-year-old

Table 3. Outcomes of abdominal gunshot wound patients

	Total (80)	Immediate laparotomy (47)	SNOM (33)	p-value
Blood transfusion, median (IQR)				
PRC	0 (0 to 6)	4 (0 to 12)	0 (0)	<0.001*
FFP	0 (0 to 4)	0 (0 to 12)	0 (0)	<0.001*
Platelets	0 (0)	0 (0 to 10)	0 (0)	<0.001*
Complications, n (%)				
Wound infection	6 (8)	6 (13)	0	0.076
Intraabdominal collection	5 (6)	5 (11)	0	0.128
Pneumonia/pleural effusion	3 (4)	3 (6)	0	0.395
Renal failure	1 (1)	1 (2)	0	1
Ventilator days, median (IQR)	0 (0)	0 (0 to 3)	0 (0)	<0.001*
LOS, median (IQR)	8 (4 to 18)	11 (8 to 26)	4 (3 to 8)	<0.001*
Mortality, n (%)	6 (8)	6 (13)	0	0.076
Exsanguination from abdominal vascular injury	5 (6)	5 (11)	0	
Exsanguination from thoracic injury	1 (1)	1 (2)	0	

SNOM = selective non-operative management; PRC = packed red blood cells; FFP = fresh frozen plasma; LOS = length of stay; IQR = inter-quartile range

* To highlight the significant values (p<0.05)

Table 4. Univariable analysis of factors associated with therapeutic laparotomy

Factors	Therapeutic laparotomy (47)	Other (33)	p-value
BMI, mean (SD)	23.1 (3.9)	24.7 (4.6)	0.200
Bullet holes >2	25	17	1
Anterior wound presence	39	18	0.012*
Positive FAST result	23	1	<0.001*
SBP, mean (SD)	104.0 (43.0)	130.0 (19.3)	0.002*
PR, mean (SD)	106.0 (31.0)	95.0 (19.5)	0.082
GCS, mean (SD)	13.5 (4.0)	15.0 (0)	0.041*
RTS, mean (SD)	6.99 (1.8)	7.84 (0)	0.009*
Hematocrit, mean (SD)	33.7 (10.8)	40.1 (5.4)	0.003*

BMI = body mass index; FAST = focused assessment with sonography for trauma; SBP = systolic blood pressure; PR = pulse rate; GCS = Glasgow Coma Scale; RTS = Revised Trauma Score; SD = standard deviation

* To highlight the significant values (p<0.05)

Table 5. Mutually independent predictor for therapeutic laparotomy

Step	Variable	Adjusted OR (95% CI)	*p*-value
1	Positive FAST	51.2 (6.3 to 414.9)	<0.001

Stepwise regression: variables considered for the model were positive focused assessment with sonography for trauma (FAST) result, systolic blood pressure ($p = 0.671$), Glasgow Coma Scale ($p = 0.324$), Revised Trauma Score ($p = 0.299$), hematocrit level ($p = 0.385$), and presence of anterior wound ($p = 0.105$). The non-significant *p*-values represent the *p*-value if each variable was added in turn to the model shown.

Table 6. Accuracy of focused assessment with sonography for trauma (FAST) as a predictor for therapeutic laparotomy

	Value	95% CI
Sensitivity	61.5%	44.6 to 76.6
Specificity	97.0%	84.2 to 99.9
Positive predictive value	96.0%	77.8 to 99.8
False positive	4.0%	0.2 to 22.3
Negative predictive value	68.1%	52.7 to 80.5
False negative	31.9%	19.5 to 48.5

CI = confidence interval

male patient with a RTA gunshot wound who had an isolated liver injury with hemoperitoneum demonstrated on CT. He underwent a successful SNOM (false positive 4%). The accuracy of FAST as a predictor for therapeutic laparotomy is summarized in Table 6.

Discussion

SNOM has been proven to be a safe and effective method in managing AGW patients since it could be done safely in 20 to 46% of the patients[3-10], and it has been shown to decrease a non-necessary laparotomy rate from 12 to 14%[1,2] to 3 to 9%[10,17]. The presence of shock, peritonitis, GI bleeding, and conditions precluding reliable abdominal examination were generally accepted as indications for immediate laparotomy[3-10,17]. Nonetheless, a controversy remained regarding SNOM in stable AGW patients without aforementioned indications for immediate laparotomy. Many investigators suggested that SNOM could be attempted in all stable AGW patients irrespective of the location of AGWs[5-10], while some investigators reserved SNOM for stable RUQ/RTA gunshot wound patients[13,14]. The authors believe that the rational approach in stable AGW patients is to firstly determine the presence of PP since tangential AGW patients could be safely managed non-operatively regardless of the wound locations as seen in 28 patients (35%) in the present study.

Several studies have shown that CT could accurately help identify PP, solid organ injury, hollow viscus injury, and the need for laparotomy in AGW patients[8,10,18-20]. Some recent studies used CT routinely as a part of initial evaluation in stable AGW patients[8,19,20], while some investigators used CT selectively in stable AGW patients with RUQ/RTA trajectory or questionable PP[10] as performed in the present study.

Only few studies have mentioned predictors for therapeutic laparotomy in AGW patients besides the presence of shock, peritonitis, and GI bleeding. Velmahos et al[7] performed SNOM in 1,856 AGW patients and demonstrated that anterior AGWs required significantly higher immediate laparotomy than posterior AGWs (66% vs. 32%, $p<0.001$). Zafar et al[16] reviewed the North American national trauma database on 12,707 AGW patients and 13,030 abdominal stab wound patients and identified factors predicting SNOM failure including the need for blood transfusion and the higher injury severity score. In the present study, we tried to identify the predictors for therapeutic laparotomy that could be easily obtained at the ED by analyzing multiple parameters (Table 4). However, only a positive FAST result was the mutually independent predictor for therapeutic laparotomy. FAST for penetrating abdominal trauma has been shown to have low sensitivity (24 to 46%) but high specificity (94%)[21,22] which corresponds well with the present study (Table 6). This means that a positive FAST result suggests that the patient is likely to need laparotomy, while a negative FAST result could not accurately rule out the need for laparotomy. To our knowledge, the present study is the first to identify a positive FAST result as a predictor for therapeutic laparotomy in AGW patients.

There are some limitations of the present study that deserve to be mentioned. Firstly, the present study is a retrospective descriptive study performed in a low volume center (80 AGW patients in 11 years) to test our SNOM protocol; this made the comparison of our outcomes to the studies from high volume centers using different SNOM criteria difficult. Secondly, we did not use CT routinely to identify PP in the stable AGW patients as 45% of the stable patients were evaluated for PP clinically. This may have made us underestimate the PP rate. Finally, we had eight patients with unknown FAST result; this decreased the reliability of our analysis in both the predictors for therapeutic laparotomy and the accuracy of FAST.

Conclusion

SNOM of AGW could be performed safely in selected group of stable patients including patients with tangential AGW, and patients with isolated RUQ/RTA gunshot wound. Laparotomy in patients with shock, peritonitis, GI bleeding, and PP other than RUQ/RTA is still a safe approach carrying a low non-therapeutic laparotomy rate. A positive FAST result may be helpful in predicting therapeutic laparotomy in AGW patients.

What is already known in this topic?

SNOM has been well accepted in AGW patients. However, there is no uniform consensus regarding the criteria for SNOM and there is limited data about the predictor for therapeutic laparotomy besides the presence of shock, peritonitis, and GI bleeding.

What this study adds?

The present study demonstrated that SNOM of AGW could be performed safely in selected group of stable patients including patients with tangential AGW, and patients with isolated RUQ/RTA gunshot wound. A positive FAST result was the only mutually independent predictor for therapeutic laparotomy identified in the present study and it may be helpful in predicting therapeutic laparotomy in AGW patients.

Potential conflicts of interest

None.

References

1. Dawidson I, Miller E, Litwin MS. Gunshot wounds of the abdomen. A review of 277 cases. Arch Surg 1976; 111: 862-5.
2. Feliciano DV, Burch JM, Spjut-Patrinely V, Mattox KL, Jordan GL Jr. Abdominal gunshot wounds. An urban trauma center's experience with 300 consecutive patients. Ann Surg 1988; 208: 362-70.
3. McAlvanah MJ, Shaftan GW. Selective conservatism in penetrating abdominal wounds: a continuing reappraisal. J Trauma 1978; 18: 206-12.
4. Muckart DJ, Abdool-Carrim AT, King B. Selective conservative management of abdominal gunshot wounds: a prospective study. Br J Surg 1990; 77: 652-5.
5. Demetriades D, Charalambides D, Lakhoo M, Pantanowitz D. Gunshot wound of the abdomen: role of selective conservative management. Br J Surg 1991; 78: 220-2.
6. Demetriades D, Velmahos G, Cornwell E 3rd, Berne TV, Cober S, Bhasin PS, et al. Selective nonoperative management of gunshot wounds of the anterior abdomen. Arch Surg 1997; 132: 178-83.
7. Velmahos GC, Demetriades D, Toutouzas KG, Sarkisyan G, Chan LS, Ishak R, et al. Selective nonoperative management in 1,856 patients with abdominal gunshot wounds: should routine laparotomy still be the standard of care? Ann Surg 2001; 234: 395-402.
8. DuBose J, Inaba K, Teixeira PG, Pepe A, Dunham MB, McKenney M. Selective non-operative management of solid organ injury following abdominal gunshot wounds. Injury 2007; 38: 1084-90.
9. Fikry K, Velmahos GC, Bramos A, Janjua S, de Moya M, King DR, et al. Successful selective nonoperative management of abdominal gunshot wounds despite low penetrating trauma volumes. Arch Surg 2011; 146: 528-32.
10. Navsaria PH, Nicol AJ, Edu S, Gandhi R, Ball CG. Selective nonoperative management in 1106 patients with abdominal gunshot wounds: conclusions on safety, efficacy, and the role of selective CT imaging in a prospective single-center study. Ann Surg 2015; 261: 760-4.
11. Demetriades D, Vandenbossche P, Ritz M, Goodmann D, Kowalszik J. Non-therapeutic operations for penetrating trauma: early morbidity and mortality. Br J Surg 1993; 80: 860-1.
12. Renz BM, Feliciano DV. Unnecessary laparotomies for trauma: a prospective study of morbidity. J Trauma 1995; 38: 350-6.
13. Renz BM, Feliciano DV. Gunshot wounds to the right thoracoabdomen: a prospective study of nonoperative management. J Trauma 1994; 37: 737-44.
14. Chmielewski GW, Nicholas JM, Dulchavsky SA, Diebel LN. Nonoperative management of gunshot wounds of the abdomen. Am Surg 1995; 61: 665-8.
15. Como JJ, Bokhari F, Chiu WC, Duane TM, Holevar MR, Tandoh MA, et al. Practice management guidelines for selective nonoperative management of penetrating abdominal trauma. J Trauma 2010; 68: 721-33.
16. Zafar SN, Rushing A, Haut ER, Kisat MT, Villegas CV, Chi A, et al. Outcome of selective non-operative management of penetrating abdominal

injuries from the North American National Trauma Database. Br J Surg 2012; 99 (Suppl 1): 155-64.
17. Lamb CM, Garner JP. Selective non-operative management of civilian gunshot wounds to the abdomen: a systematic review of the evidence. Injury 2014; 45: 659-66.
18. Ginzburg E, Carrillo EH, Kopelman T, McKenney MG, Kirton OC, Shatz DV, et al. The role of computed tomography in selective management of gunshot wounds to the abdomen and flank. J Trauma 1998; 45: 1005-9.
19. Munera F, Morales C, Soto JA, Garcia HI, Suarez T, Garcia V, et al. Gunshot wounds of abdomen: evaluation of stable patients with triple-contrast helical CT. Radiology 2004; 231: 399-405.
20. Velmahos GC, Constantinou C, Tillou A, Brown CV, Salim A, Demetriades D. Abdominal computed tomographic scan for patients with gunshot wounds to the abdomen selected for nonoperative management. J Trauma 2005; 59: 1155-60.
21. Udobi KF, Rodriguez A, Chiu WC, Scalea TM. Role of ultrasonography in penetrating abdominal trauma: a prospective clinical study. J Trauma 2001; 50: 475-9.
22. Quinn AC, Sinert R. What is the utility of the Focused Assessment with Sonography in Trauma (FAST) exam in penetrating torso trauma? Injury 2011; 42: 482-7.

การศึกษาการรักษาผู้ป่วยที่ถูกปืนยิงที่ท้อง และหาตัวทำนายว่าผู้ป่วยจะได้รับการผ่าตัดช่องท้องที่มีประโยชน์ในการรักษา

ศุภฤกษ์ ปรีชายุทธ, เกริกฤทธิ์ สุขเสถียร, สุวิทย์ ศรีอัษฎาพร, รัฐพลี ภาคอรรถ, สุกัญญา ศรีอัษฎาพร, กฤตยา กฤตยากีรณ, พสุรเชษฐ์ สมร, ณฐวรรธ นฤพนธ์จิรกุล

ภูมิหลัง: *การรักษาผู้ป่วยที่ถูกปืนยิงที่ท้องแบบไม่ผ่าตัด มีประโยชน์และเป็นที่ยอมรับในผู้ป่วยบางกลุ่ม อย่างไรก็ตามในปัจจุบันยังไม่มีเกณฑ์มาตรฐานในการเลือกผู้ป่วยที่เป็นที่ยอมรับโดยทั่วไป นอกจากนี้ข้อมูลเกี่ยวกับตัวทำนายว่าผู้ป่วยจะได้รับการผ่าตัดช่องท้องที่มีประโยชน์ในการรักษายังมีอยู่น้อย*

วัตถุประสงค์: *เพื่อศึกษาผลการรักษาผู้ป่วยที่ถูกปืนยิงที่ท้องในสถาบันของผู้นิพนธ์ และหาตัวทำนายที่จะช่วยบอกว่าผู้ป่วยน่าจะได้รับการผ่าตัดช่องท้องที่มีประโยชน์ในการรักษา*

วัสดุและวิธีการ: *ผู้นิพนธ์ทำการทบทวนประวัติของผู้ป่วยที่ถูกปืนยิงที่ท้องที่เข้ารับการรักษาตั้งแต่เดือนมกราคม พ.ศ. 2547 ถึงธันวาคม พ.ศ. 2557 แนวทางการรักษาคือผู้ป่วยที่มีภาวะช็อก ภาวะเยื่อบุช่องท้องอักเสบ หรือ ภาวะเลือดออกในทางเดินอาหารจะได้รับการผ่าตัดช่องท้องทันที ผู้ป่วยที่อาการคงที่จะได้รับการประเมินว่าวิถีกระสุนผ่านเข้าช่องท้องหรือไม่ ซึ่งผู้ป่วยที่ถูกปืนยิงที่บริเวณอื่นนอกจากช่องท้องด้านขวาบนที่คาดว่าวิถีกระสุนผ่านเข้าช่องท้องก็จะได้รับการผ่าตัดช่องท้องเช่นกัน ส่วนผู้ป่วยที่วิถีกระสุนไม่ผ่านเข้าช่องท้องและผู้ป่วยที่ถูกปืนยิงที่ช่องท้องด้านขวาบนที่ได้รับการยืนยันว่ามีการบาดเจ็บเฉพาะต่อตับหรือไตโดยการทำเอกซ์เรย์คอมพิวเตอร์จะได้รับการรักษาแบบไม่ผ่าตัด ผู้นิพนธ์ได้ใช้วิธีคำนวณทางสถิติเพื่อหาตัวทำนายที่จะช่วยบอกว่าผู้ป่วยจะได้รับการผ่าตัดช่องท้องที่มีประโยชน์ในการรักษา*

ผลการศึกษา: *มีผู้ป่วยทั้งหมด 80 ราย ในการศึกษานี้ ผู้ป่วย 47 ราย ได้รับการผ่าตัดทันที โดยมี 46 ราย ได้รับการผ่าตัดช่องท้องที่มีประโยชน์ในการรักษา มีผู้ป่วย 33 ราย ได้รับการรักษาแบบไม่ผ่าตัด ได้แก่ ผู้ป่วยที่วิถีกระสุนไม่ผ่านเข้าช่องท้อง 28 ราย (สำเร็จทุกราย) ผู้ป่วยที่ถูกปืนยิงที่ช่องท้องด้านขวาบน 4 ราย (สำเร็จ 3 ราย) และผู้ป่วยอีก 1 ราย ที่ได้รับการส่งตัวหลังจากโดนยิงมาแล้ว 3 วัน (สำเร็จ) โดยรวมแล้วการรักษาแบบไม่ต้องผ่าตัดประสบความสำเร็จในผู้ป่วย 32 ราย (40%) พบการผ่าตัดช่องท้องที่ไม่มีประโยชน์ในการรักษาเพียง 1 ราย (2%) มีผู้ป่วย 6 ราย ที่ได้รับการผ่าตัดช่องท้องเสียชีวิตจากการเสียเลือด (อัตราตาย 8%) ตัวทำนายว่าผู้ป่วยจะได้รับการผ่าตัดช่องท้องที่มีประโยชน์ในการรักษาในการศึกษานี้ คือ การตรวจด้วยคลื่นเสียงความถี่สูงแล้วพบว่ามีเลือดออกในช่องท้อง*

สรุป: *การรักษาผู้ป่วยที่ถูกปืนยิงที่ท้องแบบไม่ผ่าตัดสามารถทำได้ในผู้ป่วยที่มีอาการคงที่ และตรวจพบว่าวิถีกระสุนไม่ผ่านเข้าช่องท้องหรือ ในผู้ป่วยที่ถูกปืนยิงที่ช่องท้องด้านขวาบนที่มีอาการคงที่ ส่วนการตรวจด้วยคลื่นเสียงความถี่สูงแล้วพบเลือดออกในช่องท้องนั้นอาจมีประโยชน์ในการทำนายว่าผู้ป่วยน่าจะได้รับการผ่าตัดช่องท้องที่มีประโยชน์ในการรักษา*