*Asian Journal of Case Reports in Surgery*

*7(2): 13-18, 2021; Article no.AJCRS.65092*

# Anterior Abdominal *Vulnus Sclopetarium* (Gunshot Wound) with Incidental Intra Luminal Bullet: A Case Report

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***Authors' contributions***

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

***Article Information***

*Editor(s):*
(1) Dr. Asmaa Fathi Moustafa Hamouda, Jazan University, Saudi Arabia.
*Reviewers:*
(1) Patrick Opoku Manu Maison, University of Cape Coast, Ghana.
(2) Pushpendra Malik, Bhagat Phool Singh Government Medical College, India.
Complete Peer review History: http://www.sdiarticle4.com/review-history/65092

***Case Report***

***Received 01 December 2020***
***Accepted 04 February 2021***
***Published 23 February 2021***

## ABSTRACT

**Introduction:** Gastric perforation is one of the most common abdominal emergencies. That perforation can be caused by penetrating or blunt trauma. Injuries to the stomach are associated with the highest mortality of all hollow viscus injuries. Penetrating trauma leading to gastric perforation is more common than blunt trauma. In gastric perforation, gastric juice flows out to the abdominal cavity causing peritonitis which can develop into sepsis if remains untreated.
**Case Presentation:** A patient presented with abdominal pain in almost all regions of the abdomen. A 0.4-cm gunshot wound was found on the right side of the abdomen, with decreased bowel sound, pressure pain in all abdominal regions, and positive muscular defense. On abdominal x-ray imaging, the bullet was located in the abdominal cavity. On the anteroposterior view, it was projected on the right side of L2-3 vertebrae, 15.3 cm from the marker, and in the lateral view, the bullet was projected on L4-5 vertebrae, 16.8 cm from the marker. The bullet penetrates the stomach and caused an entry wound but no exit wound was found while the bullet found in the intestine. Operation findings a 0.4-cm air rifle bullet in ascending colon.
**Management and Outcome:** Exploratory laparotomy with primary suture of gastric perforation, bullet extraction from ascending colon, and primary repair of ascending colon were performed.
**Discussion:** Exploratory laparotomy is still the main surgical procedure of choice for patients with

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gastric perforation. Exploration is carried out with full visualization of the anterior surface of the pylorus to the esophago-gastric junction. The posterior surface of the stomach is freed from the gastro-colic ligament allowing exploration of the minor sac.

*Keywords: Generalized peritonitis; gastric perforation; penetrating trauma; Vulnus schlopetorium.*

## 1. INTRODUCTION

Gastric perforation is one of the most common abdominal emergencies, following acute appendicitis and intestinal obstruction. Gastric perforation can be caused by many conditions such as gastric ulcers, neoplasm, and trauma. The trauma caused includes penetrating or blunt trauma. Penetrating trauma is more likely to result in gastric perforation because the stomach is more anteriorly placed than the spleen and kidney. Meanwhile, blunt trauma generally follows trauma to other organs such as the spleen, liver, kidneys, pancreas, and small intestine. Moreover, injuries to the stomach due to gastric perforation are associated with the highest mortality of all hollow viscus injuries. Penetrating abdominal trauma leading to gastric perforation is more common than blunt trauma. The severity of the injury, onset, and the presentation following the last meal is important in determining prognosis. Perforation is diagnosed from clinical manifestations and the presence of free air in the peritoneal cavity through imaging evaluation. Acute perforation may result in insufficient time to form an inflammatory reaction to the gastric wall, and products in the stomach may fill inside the peritoneal cavity, causing peritonitis. Peritonitis due to perforation that is not promptly treated may cause sepsis which can progress to Multiple Organ Dysfunction Syndrome (MODS). Exploratory laparotomy is still the mainstay procedure for gastric perforation management. The management of gastric perforation caused by penetrating trauma focuses on effective resuscitation measures and surgery to close the perforation by making a patch from the omentum or by performing resection. Proper management can reduce morbidity and mortality [1,2].

## 2. CASE PRESENTATION

A 28-year-old female was admitted with a complaint of abdominal pain in almost all regions of the abdomen. One day before admission, the patient was shot by an air gun in the right side of the abdomen while riding a motorcycle. The patient reported to a tertiary hospital and then referred to the Moewardi General Hospital. The patient presented with a general state of moderate pain, fully conscious, and vital signs within normal limits.

On physical examination of the abdomen, distension and gunshot wound were seen with a diameter of 0.4 cm. Bowel sounds were decreased, and the tympanic sound was found on percussion. On palpation, there was tenderness throughout the areas of the abdomen and muscular defenses. On digital rectal examination¸ pain was present in all fields. Laboratory blood results showed a leukocyte count of 12,300/µl, increased neutrophils (83.40%), and decreased lymphocytes (12.20%).

Abdominal x-ray imaging showed a bullet-shaped foreign body in the abdominal cavity that appears to change in position, VT $12^{th}$ (at the level of $12^{th}$ thoracic vertebrae) in the supine position, VL $2^{nd}$ (at the level of $2^{nd}$ lumbar vertebrae) in the lateral projection, VL $3^{rd}$ (at the level of $3^{rd}$ lumbar vertebrae) in the Left Lateral Decubitus position, VL $2^{nd}$ (at the level of right $2^{nd}$ lumbar vertebrae) in the erect position.

Based on the history and examination, the bullet penetrates the stomach and caused an entry wound but no exit wound was found while the bullet found in the intestine. The working diagnosis is generalized peritonitis secondary penetrating gunshot wound with gastric perforation. The patient was then planned for exploratory laparotomy.

The abdomen was accessed via an extended upper midline incision. The peritoneum was exposed, and 100 cc of yellow fluid and food product was drained. Abdominal cavity exploration was then carried out, showing a perforation in the gastric antrum measuring 1 x 1 cm. Graham patch procedure and the primary suture was performed. During intestinal exploration, a perforation was found on the ascending colon; then, an incision was made and a 0.4-cm air rifle bullet was found. After the primary suturing of the wound on the ascending colon, abdominal cavity irrigation and abdominal wall closure were performed.

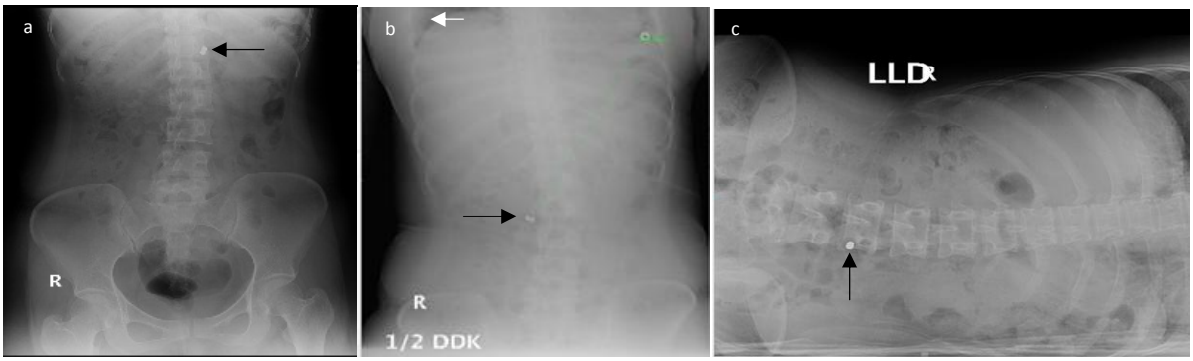


**Fig. 1. Abdominal x-ray imaging in a, supine. b, erect. and c, left lateral decubitus position. black arrow, bullet. white arrow, free air**

**Fig. 2. Gastric perforation**

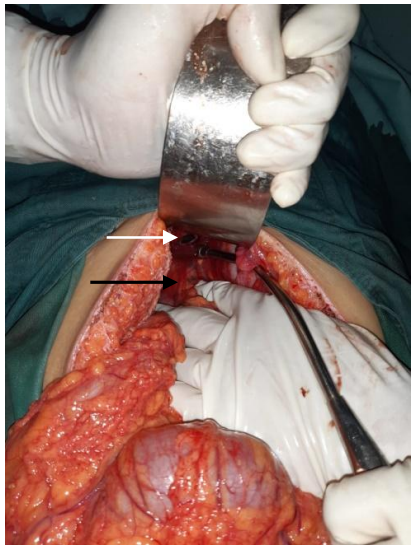

**Fig. 3. Bullet in ascending colon. white arrow, bullet. black arrow, ascending colon**

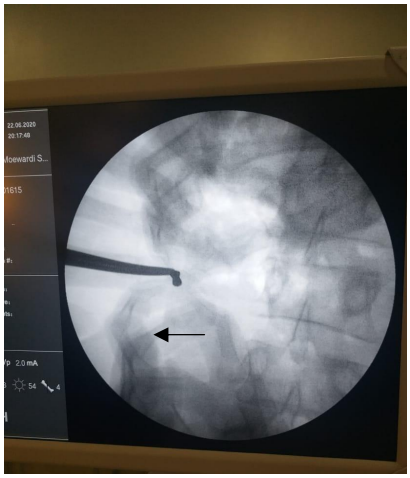

**Fig. 4. C-arm. black arrow, bullet**

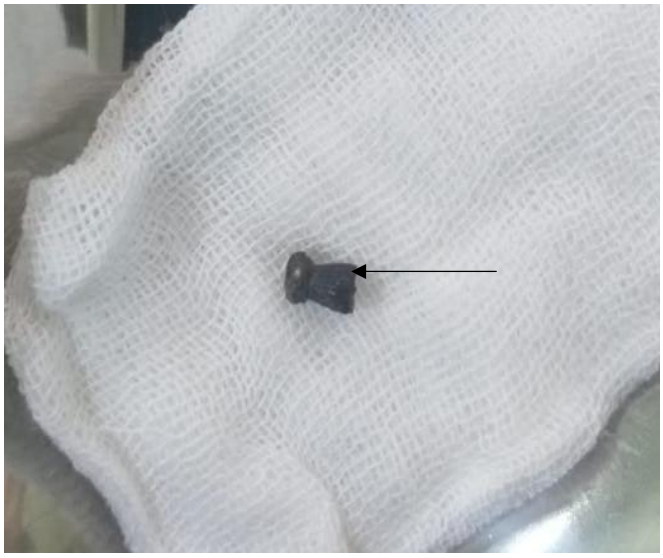

**Fig. 5. Bullet extraction of 0,4 cm diameter in size**

The post-operation working diagnosis was generalized peritonitis secondary penetrating gunshot wound with gastric and ascending colon perforations.

## 3. DISCUSSION

Penetrating abdominal trauma often results in gastric perforation because the stomach is more anteriorly placed than the spleen and kidney. This condition can occur as a result of penetrating object puncture, bullet shots, or even arrows. In gastric perforation caused by blunt trauma, it is generally followed by trauma to other organs such as the spleen, liver, kidneys, pancreas, and small intestine [3,4,5].

In penetrating trauma, space will be formed due to the object penetrating the tissue called permanent cavitation. Furthermore, as the object that penetrates the tissues is of medium to high speed, it will compress the abdominal tissue, causing it to fall apart and form hollow space. When the object stops, the tissue will return to its original place, but the hollow space formed remains and damages the surrounding tissue. Bleeding in the abdominal viscera may not cause symptoms until a sufficient amount of blood has accumulated in the abdominal cavity. This causes the signs of bleeding to possibly show later than 12 hours after the perforation [4,6].

**Table 1. Gastric perforation of penetrating trauma degree [7]**

| Grade | Description |
|---|---|
| I | Contusion/ hematoma<br>Partial-thickness laceration |
| II | Laceration < 2 cm in gastroesophageal junction or pylorus<br>< 5 cm in 1/3 proximal stomach<br>< 10 cm in 2/3 distal stomach |
| III | Laceration > 2 cm in gastroesophageal junction or pylorus<br>> 5 cm in 1/3 proximal stomach<br>> 10 cm in 2/3 distal stomach |
| IV | Tissue loss or devascularization < 2/3 stomach |
| V | Tissue loss or devascularization > 2/3 stomach |

The image that can be found on the chest X-ray is free intraperitoneal air which lies below the diaphragm. Meanwhile, the images that can be found on a CT scan with contrast include mesenteric air, gastric wall discontinuity, contrast extravasation, free intraabdominal fluid, and mesenteric hematoma [2,4].

Based on the history and examination we can conclude that the bullet penetrates the stomach and caused an entry wound but no exit wound was found then the bullet found in the intestine. Bullet penetrating trauma usually penetrates both sides of the stomach (entry and exit wounds) but in this case, there is only an entry wound.

Mandatory laparotomy was considered the standard of care for penetrating abdominal trauma but the concept of selective nonoperative management has recently been applied to gunshot wounds. A reasonable selective nonoperative management strategy for hemodynamically stable patients with penetrating thoracoabdominal trauma was close monitoring of the hemodynamics as conservative management. Initial management included chest X-rays and Focused Abdominal Sonographic Examination for Trauma (FAST). If both results are normal, then Diagnostic peritoneal lavage (DPL) can be performed with an erythrocyte threshold of 5000/mm3. If DPL is (+), it is an indication for laparoscopy or laparotomy. If the examination reveals damage to the diaphragm, laparoscopy or laparotomy should be performed. If the FAST result is positive, then a laparoscopy or laparotomy is required [8,9].

Exploration is carried out with full visualization of the anterior surface of the pylorus to the esophagogastric junction. The posterior surface of the stomach is freed from the gastro-colic ligament allowing exploration of the minor sac. Next, an assessment of the posterior gastric wall is performed by retracting the transverse colon and lifting the stomach superiorly. If there is adhesion between the posterior gastric wall and the pancreas, it may be separated to reveal the posterior wall. The major and minor curvatures should be inspected clearly because the attachment of the omentum in the area can obstruct the appearance of gastric perforation. This inspection should be performed on gunshot or stab wounds. Gastric perforations caused by bullets trauma can generally penetrate deep into organs, in contrast, to stab wounds which usually hit partially [7].

## 4. CONCLUSION

Gastric perforation caused by penetration trauma may cause symptoms to show slowly, according to the rate of blood or intestinal content accumulation in the abdominal cavity. Therefore, clinicians must be able to recognize the early signs and maintain the patient's condition. Exploratory laparotomy and repair of gastric perforation is still the procedure of choice for gastric perforation following penetrating abdominal injury.

## CONSENT

As per international standard and university standard, the patient’s written consent has been collected and preserved by the authors.

## ETHICAL APPROVAL

As per international standard and university standard, written ethical approval has been collected and preserved by the authors.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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