

Anesthesia Management in Laparotomy of Gastric Perforation Peritonitis: A Case Report and Literature Review

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ABSTRACT

Gastric perforation has the potential to induce acute peritonitis, leading to intense pain and a significant mortality risk. A female patient, aged 67, presented with symptoms of intense abdominal pain affecting all regions of the abdomen and extending to the shoulder. The pain does not alleviate with rest and is aggravated by physical activity and coughing. The Chest X-ray examination revealed the presence of cardiomegaly, characterized by an enlarged heart and aortic elongation. The Abdomen X-ray examination revealed the presence of a pneumoperitoneum. Laparotomy may be conducted in individuals with gastric perforation to identify the pneumoperitoneum's underlying aetiology. The utilization of a concurrent administration of spinal anaesthesia (SA) and general anaesthesia (GA) demonstrates the effective reduction of hemodynamic impact during pneumoperitoneum while avoiding any associated adverse effects.

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Introduction

Gastric perforation is a complex penetration of the wall of the stomach, large intestine, and small intestine, resulting in the intestine's contents flowing into the abdominal cavity.¹ Acute peritonitis from gastric perforation can result in excruciating discomfort. Seventy per cent of peptic ulcer disease-related deaths result from gastric perforation. The patient's mortality rate is frequently correlated with the perforation's diameter. Gastric resection or suturing of the perforation site are steps in managing gastric

perforation after urgent surgery.³ Patients with stomach perforation may undergo laparotomy to determine what led to the development of pneumoperitoneum. Additionally, a laparotomy might be therapeutic by sealing the punctured organ.³

The choice of anaesthesia modality for a laparotomy procedure is contingent upon several factors, including the patient's age, overall health status, general well-being, and the available resources and expertise of the surgical team, including surgeons, anaesthetists, and nurse

anaesthesiologists.⁴ Individuals scheduled to undergo laparotomy have the option to receive either general anaesthesia or regional anaesthesia.⁵ In a study conducted by Ghodki PS (2014)⁶, it was demonstrated that the utilization of a concurrent administration of spinal anaesthesia (SA) and general anaesthesia (GA) effectively mitigates the hemodynamic consequences of pneumoperitoneum.⁷ This combination approach was found to be devoid of any adverse effects. Utilizing both methodologies yields enhanced stability in cardiocirculatory function compared to the exclusive use of general anaesthesia.⁶ This article presents a case report on peritonitis resulting from gastric perforation surgery performed under the administration of both general and spinal anaesthesia.

Case(s)

A 67-year-old female patient presented with symptoms of intense abdominal pain affecting all regions of the abdomen and extending to the shoulders, which had been ongoing for 5 hours before admission to the hospital. The pain sensation does not improve during rest periods but intensifies with physical activity and coughing. The patient also experiences a sensation of abdominal tightness and rigidity resembling a solid wooden surface. Pain is concomitant with symptoms such as muscular debility, abdominal distension, queasiness, lightheadedness, and perspiration characterized by decreased body temperature. The patient also disclosed a lack of bowel movements and flatus within the past 24 hours. In the past, patients frequently reported experiencing heartburn characterized by intermittent episodes of a burning sensation, which the administration of ulcer

medications alleviated. The patient presents with a medical background of hypertension and diabetes mellitus, for which the prescribed treatment regimen consists of amlodipine 5 mg and metformin 500 mg regularly. The physical examination yielded the following findings: the individual's body weight was measured to be 60 kilograms, total body height was recorded as 150 centimetres, blood pressure was measured at 180/90 millimetres of mercury, pulse rate was observed to be 80 beats per minute, respiration rate was noted to be 20 breaths per minute, and their body temperature was measured to be 37.1 degrees Celsius. The findings from the assessment of the localized condition of the abdomen revealed diminished bowel sounds, a firm and rigid sensation akin to a board, tenderness throughout the abdominal area, diffuse tenderness, muscular guarding, pain upon percussion, and tympanic percussion. The laboratory analysis revealed a hematocrit level of 27%, hemoglobin concentration of 8.4 g/dl, leukocyte count of 19,900 ul, and blood glucose level of 193 mg/dl. The chest X-ray examination revealed the presence of cardiomegaly accompanied by aortic elongation, as depicted in Figure 1. The abdominal region was subjected to a plain X-ray examination, which revealed the presence of a pneumoperitoneum, as depicted in Figure 2.



Figure 1. In the first admission, enlarged heart was seen, cardio thorax ratio was 58%.

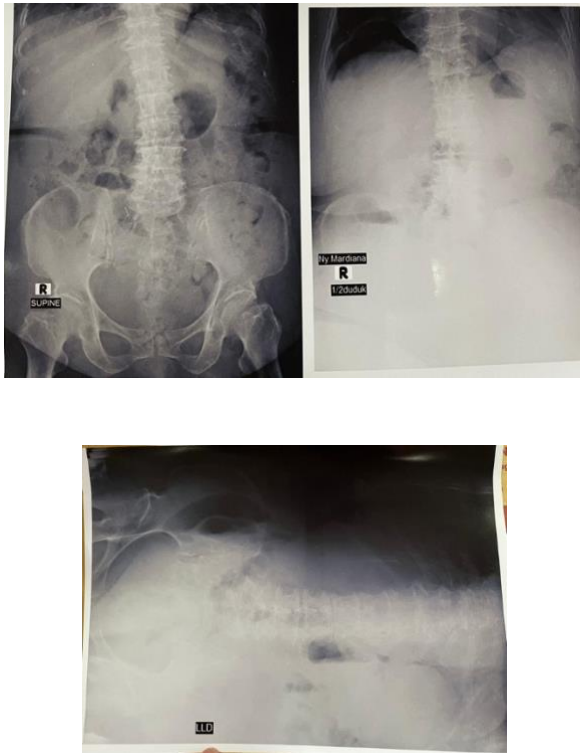


Figure 2. Abdominal x-ray showed pneumoperitoneum.

The patient is in a fasted state for 6 hours. The patient was premedicated with oral Ondansetron 4 mg and intravenous lactated ringer's solution 500 ml. Noninvasive blood pressure, oxygen saturation, electrocardiogram (ECG), and urinary catheter were monitored with oxygen intake. The initial vital signs were listed below: blood pressure (BP) 170/70 mmHg; heart rate (HR) 91 bpm; SpO₂ 99%. ECG showed a sinus rhythm of 91 Bpm. The patient was pre-oxygenated with 100% with 3lpm flow. Bupivacaine 0,5% 3 ml was injected as spinal analgesia. After approximately 10 minutes, rapid induction of general anesthesia for intubation was conducted with 1% propofol 100 mg, fentanyl 80 mcg, midazolam 1 mg, and Atracurium Besylate 20 mg. The patient was intubated using no.7 cuffed endotracheal tube. The cuff was inflated, and the tube was fluxed after checking bilateral air entry. Sevoflurane 1,5% was given as inhalation analgesia. The patient was

steady during the surgery, with an average blood pressure of 146/80 mmHg, HR 87 times/minute, and SpO₂ of 98 to 100%. The total amounts of intraoperative transfusion were plasma 200 ml and lactated ringer's solution 500 ml. The gastric resection was performed which lasted three hours. The total urine output was 100cc and blood loss was 200 ml.

After surgery, the patient was safely transferred to the Intensive Care Unit (ICU) to receive further treatment and later extubated after fully awake. With a follow-up in ICU, he was conscious and in good condition without complaints of headaches and nauseous. Vital signs were as follows: body temperature 36,6 °C, BP 151/78 mmHg, HR 91 bpm, SpO₂ maintained at 98% by nasal oxygen 3 L/min.

Discussion

Gastric perforation refers to the pathological process wherein the integrity of the gastric wall is compromised, leading to the formation of an opening that establishes a communication between the gastric lumen and the peritoneal cavity. A peptic ulcer is identified as the predominant etiological factor contributing to gastric perforation. This disease typically manifests in the geriatric population, particularly among individuals with a documented history of nonsteroidal anti-inflammatory drug (NSAID) usage and those who engage in excessive alcohol consumption. Furthermore, gastric perforation can be attributed to malignancy and interventional procedures and may manifest spontaneously in neonates. The number of male patients exceeded that of female patients, with a higher prevalence observed among individuals aged 50 to 59 years.²

In this case, the patient is categorized as geriatric according to the World Health Organization's (2010) definition, which designates individuals aged 65 years or older as geriatric.⁸ The utilization of pharmaceutical substances poses a heightened risk in the geriatric population, consequently augmenting the likelihood of encountering adverse effects associated with said medications.⁹ Geriatric individuals undoubtedly undergo the process of aging, which is accompanied by a decline in the functioning of organ systems and a reduction in the capacity to respond to acute stressors. Hence, it is imperative to prioritize evaluating the patient's physiological state to establish a secure and efficient anaesthetic strategy before any medical procedure.¹⁰

The ASA scoring system, developed by the American Society of Anesthesiologists (ASA), serves as a means of categorizing and evaluating the physiological status of patients during the perioperative period. This classification system aids in the estimation of surgical risk. In this instance, the patient exhibited an ASA III score alongside the coexistence of hypertension and type II diabetes mellitus. This issue is of concern due to the notable correlation between elevating the ASA score and escalating mortality rates following anaesthesia.^{11,12} The administration of intravenous anaesthetics has yielded favorable outcomes regarding blood glucose levels and complications among individuals diagnosed with type 2 diabetes, compared to inhalational anaesthetics. The administration of inhaled anaesthetics has been observed to induce impaired glucose tolerance and insulin secretion by inhibiting ATP-sensitive potassium channels in beta cells. Consequently, this mechanism can lead to hyperglycemia during the perioperative period.¹¹ Patients with a preexisting

hypertension diagnosis may experience a worsening of their condition, known as severe hypertension, during the period following a surgical procedure.¹³ Consequently, it is imperative to closely observe and provide appropriate cautionary measures to patients with severe hypertension, particularly if their management becomes challenging or uncontrollable.¹²

General anesthesia (GA) is the prevailing method employed for both laparoscopic and laparotomy procedures due to its ability to effectively manage surgical pain and enhance patient comfort during the pneumoperitoneum and Trendelenburg positions.¹⁴ *General anesthesia* is a medical technique that ensures a protected airway and enables effective control of ventilation, thereby mitigating the occurrence of hypercarbia. Nevertheless, the patients experienced episodes of hypertension due to stress-induced sympathetic stimulation during intubation, in conjunction with the sympathetic activity triggered by pneumoperitoneum.⁶

Regional anaesthesia is widely acknowledged for its ability to mitigate the adverse effects associated with general anesthesia, including but not limited to nausea, vomiting, sore throat, tooth injury, sedation, postoperative atelectasis, and hypoventilation.^{15,16} The potential adverse effects of general anaesthesia, including airway trauma, myalgias, and sore throats, can be mitigated through regional anaesthesia. Furthermore, regional anaesthesia has been shown to facilitate expedited cognitive recovery and oral intake during the immediate postoperative phase.¹⁷ Regional anesthesia offers several potential advantages, including expedited recuperation and efficient management of postoperative pain. Regional anesthesia has been employed in

laparotomy procedures for patients exhibiting compromised cardiopulmonary function due to its minimal impact on cardiopulmonary function. The administration of regional anesthesia has potentially resulted in adverse effects, including significant hypotension and discomfort in the shoulder region due to irritation of the diaphragm.¹⁸

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When systemic arterial (SA) administration is combined with general anesthesia (GA), the application of SA-induced sympathectomy can effectively restrict the rise in systemic vascular resistance (SVR), thus counteracting the elevation in mean arterial pressure (MAP). The study conducted by Ghodki PS (2014) corroborated these findings, indicating that the mean arterial pressure (MAP) was effectively sustained during pneumoperitoneum in the group that received a combination of spinal anesthesia (SA) and general anesthesia (GA), in contrast to the group that solely received GA.⁷

In this instance, postoperative bleeding was monitored within the recovery room. The individual exhibited complete consciousness, as indicated by an Aldrette score of 10. The patient was under observation in the Intensive Care Unit (ICU), and no instances of postoperative bleeding were observed. Subsequently, the patient was transferred to the hospital ward in a notably enhanced state.²⁰

The patient's vital signs were monitored before, during, and after the operation, revealing that the patient's condition remained favorable and hemodynamically stable throughout the procedure, facilitated by the administration of general and spinal anesthesia.

Conflicts of Interest

The author started there is no conflict of interest

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