Isolated Right Gastric Artery Injury Following A Blunt Trauma

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ABSTRACT A 54-year-old civil engineer received the weight of the tight quarter excavator for a moment at 11 am on June 1, 2002, while operating the one. The handlebar then struck him on the epigastrium. He was transported in an ambulance after about an hour after injury to our hospital, complaining of abdominal severe pain. He had epigastric pain with a golf ball-like swelling in the epigastric region. He had a remarkable tenderness with rebound pain on his upper abdomen without obvious external injury. Upper abdominal enhanced computed tomography visualized massive hematoma in bursa omentalis with extravasation of contrast media in lesser curvature of stomach, and moderate volume of a hemoperitoneum in liver border. He developed in hemorrhagic shock on examination at the emergency room. We suspected that he had intraabdominal hemorrhage possibly due to injury of visceral artery around the stomach, and an emergency laparotomy was performed for the purpose of hemostasis. At laparotomy, active bleeding from transected right gastric artery where it originated from the common hepatic artery with a large mass of hematoma in bursa omentalis was doubly ligated proximally and distally. The patient recovered uneventful and was discharged on the 14th day after injury.

(JJAAM 2005 ; 16 : 182-6)

Keywords: blunt abdominal trauma, right gastric artery injury, intraperitoneal hemorrhage, hemorrhagic shock
Accepted for publication on December 6, 2004 (04-075)

Introduction

Blunt abdominal trauma frequently results in injuries to the intra-abdominal organs. The mechanisms of these injuries can be explained by tangential tearing forces or crushing injury, and these injuries most often involve classically the liver, spleen, kidney, pancreas, gastrointestinal tract, genitourinary tract, and biliary tract. Blunt abdominal trauma rarely causes isolated vascular injuries. The frequency of isolated vascular injury currently accounts for approximately 3 per cent of all civilian vascular

trauma¹⁾. It is mostly caused by seatbelt injury secondary to motor vehicle collisions. We report a case of isolated right gastric artery injury from blunt trauma without other related injuries.

Case Report

A 54-year-old civil engineer momentarily bored with weight of a tight quarter excavator which overturned as he was loading it on a truck (**Fig. 1a, b**). The handlebar then struck him on the epigastrium (**Fig. 1c**). He was referred by an ambulance to our hospital about an hour after his injury, complaining of severe abdominal pain. His medical history had undergone a laparotomy due to a small intestinal perforation caused by a traffic accident at 44 years of age. On examination, his blood pressure and pulse rate were 130/80mmHg and 70/min. He had severe epigastric pain with a golf ball-like swelling in the epigastric region. He had a marked tenderness with rebound pain on his upper abdomen without obvious external injury. Laboratory findings on arrival showed that the hemoglobin was 14.2 g/dl and the remainders of his serum tests were within

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Fig. 1. The tight quarter excavator.

normal limits. X-rays of the abdomen were also normal. Upper abdominal enhanced computed tomography visualized of the fasciae laceration rectus abdominis muscle near by the epigastric region with disposition of some greater omentum out of the abdominal cavity to the sub-

Fig. 2. Abdominal enhanced computed tomography on admission. The arrow demonstrates extravasation of contrast media along the lesser curvature of stomach.

cutis, massive hematoma in the bursa omentalis with extravasation of contrast media along the lesser curvature of the stomach, and moderate volume of hemoperitoneum in liver circumference (**Fig. 2**). The computed tomography showed no evidence of other injuries of abdominal aorta,

portal vein and inferior vena cava. His blood pressure gradually dropped to below 90mmHg following his arrival at hospital, and he developed in hemorrhagic shock during the examination. His hemoglobin rapidly lowered to 9.7 g/dl during blood examination. We suspected that he had intraabdominal hemorrhage as a result of arterial injuries around the stomach by the abdominal enhanced computed tomography. After about 2 hours from the injury, an emergency laparotomy was performed for the purpose of hemostasis and exploration of other abdominal visceral injuries. At laparotomy, an upper abdominal hernia of the greater omentum to the subcutis with diastasis recti about 4cm in length and also the adhesion of greater omentum to the abdominal wall due to the previous operation were found. Active bleeding from the transected right gastric artery originated from the common hepatic artery with a large mass of hematoma in bursa omentalis was doubly ligated proximally and distally. The other abdominal organs were normal. A total of 9 units of packed red blood cells and 5 units of fresh-frozen plasma were administered. The patient had an uncomplicated recovery and was discharged on the 14th day after the injury.

Discussion

The most common cause for blunt abdominal trauma in industrialized countries is automobile accidents, and the mechanisms of abdominal trauma are impact against the steering wheel or an improperly placed lap-type seatbelt. Isolated major visceral arterial injuries caused by blunt trauma are rare. In particular, isolated right gastric artery injury caused by blunt trauma is particularly rare. Review of the Japanese literature revealed no previously reported cases of isolated right gastric artery injury following a blunt trauma. This extremely low incidence for major visceral vascular injuries have been accounted for prominently lethal injuries and died of exsanguinations before medical intervention. In review of the literature, injuries to the abdominal aorta and its visceral branches are potentially fatal due to exsanguination, with reported mortality rates in excess of 50 percent²⁾. Accordingly, immediate operative intervention is mandatory.

The pathophysiology of blunt abdominal vascular trauma consists of two mechanisms, which are compression and deceleration type. Compression involves avulsion of large arteries or visceral small branches with free hemorrhage into the abdominal cavity leading to shock, whereas deceleration results in intimal tear and secondary thrombosis of the arterial lumen³⁾. In our case, it is hy-

Fig. 3. Scheme of our case.

a: The mechanism of injury.

b: The right gastric artery was disrupted from the hepatic artery and actively exsanguinated.

pothesized that the impact of the handlebar resulted in a compression injury. Specifically, we thought that the injury observed in this patient was probably due to two factors; the sudden displacement of the stomach and duodenum by the handlebar's impact to the epigastrium, and avulsion of the omentum resulting from the adhesion of greater omentum to the abdominal wall due to the previous operation. In addition, there are some reports as to the importance of the amount of atheromatous disease present in the injured vessels. Early reports concluded that arteriosclerosis was not related to the injury, but more recent literature seems to imply that the loss of elasticity and compliance of the vessel plays a role in the genesis of ar-

terial injury⁴⁾.

Other factors influencing the transfer of energy to the right gastric artery include the character of the trauma, the state of contraction of the abdominal wall, and the body build of the individual.

The diagnosis of abdominal vascular injuries is predicated on a thorough physical examination with a suspicion of abdominal injuries⁵⁾. In order to notice the site and extent of the injury and to plan an operative method, ultrasonography or enhanced computed tomography should be obtained in a stable patient. In addition, hemodynamically stable patients should undergo angiography since it provides critical information for decision-making of treatment and radiological treatment can be done with transcatheter arterial embolization⁶⁻⁸⁾. In our case, angiography could not be performed due to the patient's poor general condition with hemorrhagic shock, and an emergency operation was performed in consideration of the potential visceral arterial injury. In recent years, interventional radiological procedures have established themselves as important options in the management of some abdominal vascular injuries. However, we retrospectively thought that the control of bleeding from the right gastric artery injury might be unable to successfully managed with superselective transcatheter arterial embolization in our hospital due to the technical difficulty.

Current treatment modalities for vascular injury are various. They include repair, resection and repair, autogenous or prosthetic replacement, bypass, and ligation. This patient's trauma was limited to the upper abdomen (**Fig. 3a**), unlike most previously reported cases of blunt abdominal trauma, which are associated with multiple injuries. In our case, ligation was chosen because of the complete transection of the right gastric artery (**Fig. 3b**).

In conclusion major visceral vascular injuries can result in high morbidity and mortality. A high index of suspicion is needed to provide prompt diagnosis and adequate treatment. Successful management of patients with injury to the visceral arteries must include aggressive volume replacement and rapid exposure of the injuries. In this patient with disruption of the right gastric artery, identification and exposure of this unusual injury allowed simple ligation as definitive treatment. It is of crucial importance that, regardless of shock, laparotomy is promptly performed at the appropriate time.

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症例報告

腹部鈍的外傷による右胃動脈単独損傷の1例

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要旨 症例は54歳の男性。既往歴は44歳時に外傷性小腸穿孔のため手術施行。48歳時より発作性心房細動にて内服治療中であった。2002年6月午前11時頃、作業場で小型重機運転中に横転し、一時的に小型重機の下敷きとなった。その際、操作レバーにて上腹部を強打し、上腹部激痛を主訴に午前11時45分当院へ救急搬送された。来院時は意識清明、血圧130/80mmHg、脈拍70/min・整であり、顔面は苦悶状でやや蒼白であった。腹部は剣状突起下でゴルフボール大の隆起を認め、自発痛・圧痛は著明であった。腹部造影CTで、胃の背側に多量の液体貯留像を認めるとともに、胃前庭部背側で造影剤の血管外漏出像を認めた。短時間のうちにショック状態となったため、来院2時間後に緊急開腹術を施行したところ、上腹部の腹直筋筋膜は断裂し、皮下に一部大網の脱出を認めた。網嚢内に大量の血腫と右胃動脈からの出血を認めたため右胃動脈を結紮止血した。術後経過としては、再出血などの合併症は認めず、第14病日に退院した。腹部鈍的外傷による右胃動脈単独損傷が原因の稀な腹腔内出血を経験したので報告する。

(日救急医学会誌 2005; 16: 182-6)

キーワード：腹部鈍的外傷，右胃動脈損傷，腹腔内出血，出血性ショック

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原稿受理日：2004年12月6日(04-075)