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Skin-only closure for surgical closure of the difficult abdomen with massive visceral edema : A case report

Wisuttiluk Satawathananont*

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A 51-year-old woman presented with anemia and cholangitis. Abdominal computed tomography scan was done; the result revealed a periampullary mass and distal obstruction of the common bile duct. Exploratory laparotomy was performed and an unresectable periampullary tumor that invaded the branches of the mesenteric vein was found. Accidentally, intra-abdominal bleeding from the branches of the mesenteric vein occurred during the operation; the bleeding was stopped by suturing. The patient received a large amount of fluids resuscitation and bowel edema also developed so much that the fascia could not be closed. The skin-only closure was performed as an alternative method of abdominal wall closure. Postoperatively, the patient did not develop abdominal compartment syndrome. The patient, however, developed an incisional hernia that was repaired with mesh 10 months after the abdominal closure.

Keywords : *Skin-only closure, abdominal wall closure, incisional hernia, periampullary tumor, abdominal compartment syndrome.*

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**วิสุทธิลักษณ์ สัตตวัฒนานนท์. การเย็บเฉพาะผิวหนังเพื่อปิดหน้าท้องในผู้ป่วยที่มีลำไส้
บวมมาก. จุฬาลงกรณ์เวชสาร 2558 พ.ย. – ธ.ค.; 59(6): 657 – 65**

รายงานนี้นำเสนอ ผู้ป่วยหญิงไทย อายุ 51 ปี มาด้วย anemia และ cholangitis ผลการตรวจ
computed tomography whole abdomen พบ perampullary mass และ distal common bile duct
obstruction ได้ทำผ่าตัด exploratory laparotomy พบ unresectable perampullary tumor ลุกลาม
ไปที่แขนงของ mesenteric vein ขณะผ่าตัดเกิดภาวะเลือดออกซึ่งควบคุมได้โดยการเย็บหยุด
จุดเลือดออก และเนื่องจากผู้ป่วยได้รับ fluid resuscitation จำนวนมากจึงเกิดลำไส้บวมมาก
ทำให้เย็บปิดผนังหน้าท้องแบบปกติไม่ได้ ศัลยแพทย์จึงตัดสินใจเย็บเฉพาะผิวหนังปิดหน้าท้องเพื่อ
หลีกเลี่ยงภาวะความดันในช่องท้องสูง หลังผ่าตัดพบว่าผู้ป่วยไม่เกิดภาวะ abdominal compartment
syndrome การดูแลหลังการผ่าตัดใช้วิธีการทำแผลแบบธรรมดา จากการติดตามหลังการผ่าตัดผู้ป่วยมี
incisional hernia และได้รับการผ่าตัด repair incisional hernia ที่เวลา 10 เดือนต่อมา

คำสำคัญ : การเย็บเฉพาะผิวหนังเพื่อปิดหน้าท้อง, ภาวะความดันในช่องท้องสูง, การผ่าตัด repair
incisional hernia.

With changes in surgical care, open abdomen in critically ill patients has become increasingly common. Several techniques have been proposed for this particularly difficult problem. Thus, skin-only closure has been abandoned with the onset of the widespread practice of open abdominal wound management for damage control and prophylaxis against abdominal compartment syndrome.^(1, 2) I, hereby, present my experience with an approach to manage difficult abdominal wall closure by immediate skin-only closure that provides a sturdy closure and minimizes skin damage in a properly selected patient.

Case Report

A 51-year-old woman presented with syncope, jaundice, weight loss 3 kg, fatigue and anorexia for 2 months. At a district hospital, her anemia was treated by a transfusion of 4 units of packed red blood cells (PRC) before being referred to Phra Nakhon Si Ayutthaya Hospital. She complained of increasing jaundice and fever with chill 3 days prior to admission. Her vital signs on admission were blood pressure 102/59 mmHg, pulse rate 70 beats/min and body temperature 38.5 °C. On physical examination,

she had markedly icteric sclera with a 4 × 3 cm mass on the epigastrium. Her blood tests included Hct 27.3%, Hb 8.4 g/dL, MCV 74 fl, RDW 23.8%, WBC 11,600 / μ L, neutrophils 71.4%, lymphocytes 20%, platelets 644,000 / μ L, PT 12.3 sec, PTT 25.4 sec, INR 1.1, TB 18.7 mg/dL, DB 16.3 mg/dL, ALP 520 U/L, SGOT 133 U/L, SGPT 60 U/L, CA 19-9 > 10,000 U/ml, CEA 1.71 ng/ml and AFP 1.64 ng/ml. There were anemia and cholangitis. The patient received 4 units of PRCs, antibiotics and enteral nutrition. Abdominal ultrasonography demonstrated an ill-defined hypoechoic mass at the distal common bile duct (CBD) and diffuse dilatation of the intrahepatic bile ducts and the proximal CBD (Figure 1). Abdominal computed tomography (CT) scan confirmed the presence of a 4 × 3 × 3 cm³ mass at the distal CBD, moderate dilatation of the proximal CBD and mild dilatation of the intrahepatic bile ducts. Periapillary tumor with duodenal invasion was suspected (Figure 2). The diagnosis was periampullary tumor with CBD obstruction. Whipple operation was then planned as the tumor was resectable. The patient was advised for the possibility of unresectable tumor which the surgeons would only correct CBD obstruction.



Figure 1. Ultrasonography identifies a hypoechoic mass at the distal CBD (arrow head).



Figure 2. CT scan reveals a hypodense mass at the distal CBD (arrow head).

Exploratory laparotomy was performed using midline incision. The intraoperative finding noted an ill-defined hard mass at head of the pancreas that invaded the branches of the mesenteric vein with partial duodenal obstruction at 1st and 2nd part and minimal ascites without both liver cirrhosis and metastasis. Whipple operation was terminated because of the unresectable tumor. Accidentally, intra-abdominal bleeding from the branches of the mesenteric vein occurred. However, the bleeding could be stopped by suturing. The surgeons inserted T-tube into the distal CBD and performed gastrojejunostomy for treatments of duodenal and CBD obstruction instead. This unstable patient received a large amount of resuscitation fluids such as crystalloids 1800 cc, colloids 1500 cc, 5 units of PRCs and 4 units of fresh frozen plasma (FFP). The total estimated blood loss was 2000 cc. After resuscitation, the fascia was unable to be closed primarily without excessive tension because massive bowel and abdominal wall edema took place. Then skin-only closure was performed for abdominal wall closure. At first, retention sutures were loosely placed through both sides of the fascia anteriorly to the

posterior rectus sheath. After then, vertical mattress nylon sutures to the skin were placed between each of the retention sutures. Retention sutures were then tied in a simple interrupted suture, mandating abdominal wall closure without tension. The patient did not have high airway pressure in the operating room.

During the postoperative period, she was observed for signs and symptoms of abdominal compartment syndrome (ACS) in the surgical intensive care unit. The patient did not have postoperative ACS. The vital signs as well as urine output were normal. She did not fight against a ventilator. Neither hypothermia nor thrombocytopenia was found. Arterial blood gas showed no acidosis. She obtained resuscitation fluids but reduced crystalloids to increase colloids including albumin due to her hypoalbuminemia for the purpose of minimizing bowel edema.^(1,3-5) In addition, parenteral nutrition was given. A number of ascites leakages were found at the surgical wound and penrose drain site 2 days later. Wound dressing was renewed many times. Ten units of FFP and 3 units of PRCs were totally transfused. Reduction of ascites leakages appeared at the 4th

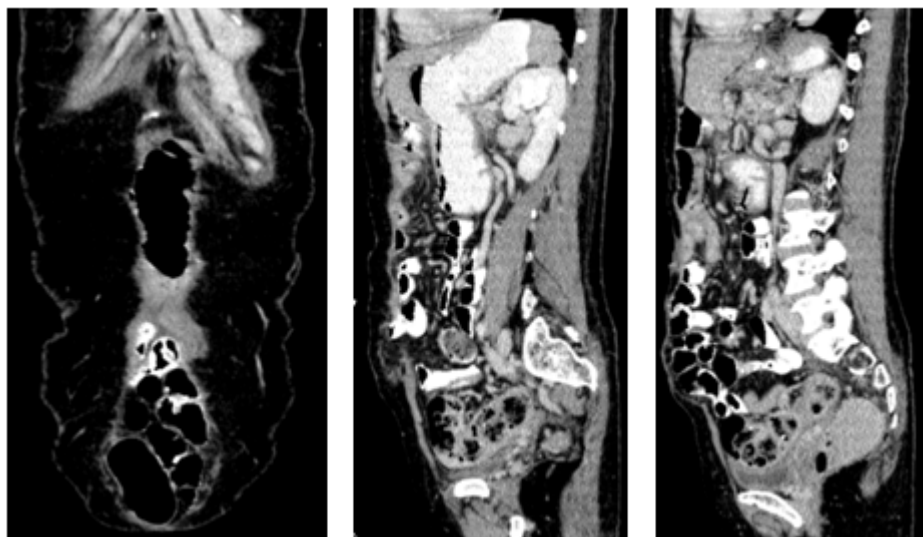
postoperative day. As she had high fever, a septic workup was initiated. Staphylococcus coagulase negative septicemia caused by central venous catheter infection was found by means of hemoculture. Therefore the catheter was removed and antibiotics was changed depending on its sensitivity. On postoperative day number 6, she had bowel movements. The ventilator could be weaned off and endotracheal tube was removed. She was then moved to the ward. Until the 8th postoperative day, her abdomen did not distend. She began to have enteral nutrition. By the 10th postoperative day, the wound was somewhat healed so sutures of the skin were stitched off. When obstructive jaundice

subsided, the patient was discharged home. During hospitalization, she was also informed about her incisional hernia. The incisional hernia was 10 cm in width. Retention sutures were removed by five weeks after closing the abdomen (Figure 3). However, the patient refused to be repaired the incisional hernia and to be referred to the cancer institute.

Ten months after the operation, her abdomen developed an incarcerated incisional hernia which was soon repaired with mesh. CT scan of abdomen revealed an 8 × 20 cm incisional hernia with a large hypodense mass at periampullary region and no metastasis (Figure 4). She had lost to be followed up since four months after the second operation.



Figure 3. An abdominal wall after skin-only closure.



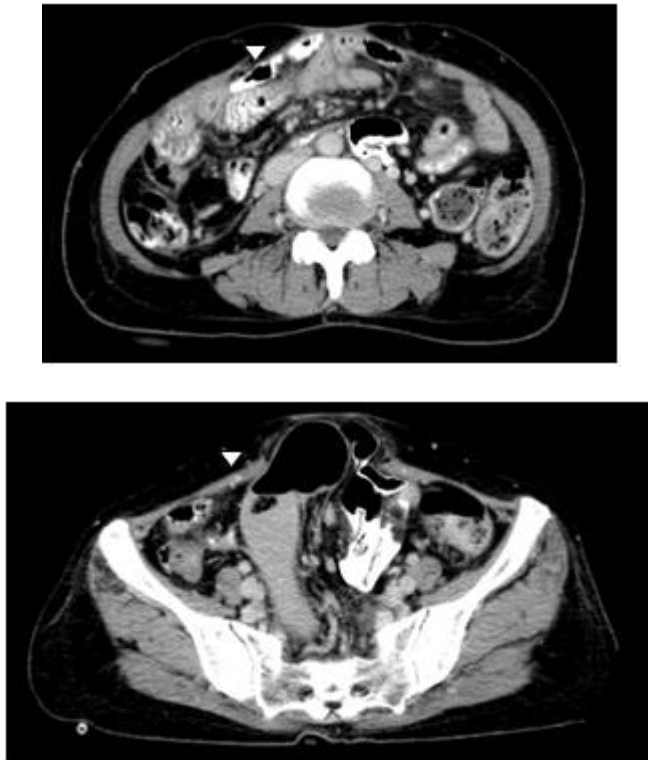


Figure 4. CT scan indicates an incisional hernia (arrow heads) containing the bowel.

Discussion

This periampullary tumor patient developed abdominal wall and bowel edema during the initial operation after massive fluid resuscitation. Under this condition, primary closure of fascia was impossible, an attempt to close the fascia forcefully may lead to increased intra-abdominal pressure, wound infection, fascial dehiscence, abdominal wall necrosis and enterocutaneous fistula.^(6, 7) The suture line tension is associated with intra-abdominal hypertension and abdominal compartment syndrome (ACS).^(7, 8) The possible consequences of ACS are bowel ischemia from reducing intestinal mucosal blood flow, increased airway pressure, renal failure, and hemodynamic instability.⁽⁴⁻⁸⁾ Temporary abdominal closure (TAC) has been used for damage control surgery in most of the patients who are unable

to receive fascial closure successfully because of visceral edema. Many methods of TAC were described for acute management of this problem. Temporary closure of the skin spares the fascia for definitive closure at the time of reconstruction. The different methods result in a number of outcomes for the patients. The most appropriate method is to bring about successful fascial closure.^(2, 6, 7) In this case the surgeons immediately applied skin-only closure as TAC to cover fascial defect since the elasticity of the abdominal skin is able to increase intra-abdominal volume.^(2, 8) Accordingly this practice prevents development of ACS.

Suture or towel clip closure of the skin has been reported for TAC in the management of traumatic intraabdominal bleeding with tamponade in the swab-packed abdomen. In addition, it has been used in

patients with unstable trauma or complicated intra-abdominal infection who receive massive crystalloid resuscitation resulting in visceral edema.^(1,2,4,6-9) This approach protects the viscera from environmental exposure and minimizes contamination of the abdomen. A decreased incidence of infectious complications should be anticipated. Furthermore, skin closure minimizes heat and fluid loss. Concurrently, the fascia and skin preservation is beneficial for subsequent fascial closure.⁽²⁾ Most surgeons no longer use towel clips in trauma patients because these multiple clips may interfere with interpretation of any necessary angiography. Another disadvantage includes possible evisceration between towel clips.

It may be necessary to complete closure of the wound. Vertical mattress skin-only sutures were chosen for this patient. Providing that local wound infection had been found, the suture lines could have been stitched off separately. This practice reduces wound evisceration and a risk of fistula formation. More importantly, this technique simplifies wound care with the least charges. As a result, her only surgical complication was catheter septicemia. ACS, wound infection, enterocutaneous fistula and intra-abdominal abscess did not occur. However, if at the initial step of operation the surgeon is faced with a patient with massively edematous bowel, skin closure may not be possible due to tension. Under this situation, excessive force leads to ACS, failure of wound closure, skin necrosis, wound infection and skin loss. Disadvantages depending on the tension of the closure include burned abdominal wall and traumatic skin loss. Another method of TAC is searched out. Other complications of the patients include wound

dehiscence, enterocutaneous fistula, intra-abdominal abscess and skin necrosis.^(1,6,7,9) These complications were similarly found in other temporary closure methods.

As ACS has been reported to occur from 14 to 36% of the patients managed by skin closure alone, these skin-only closure techniques are used much less frequently than they were in the past.^(4,7,8) The incidence of ACS increases in the use of intra-abdominal packing.^(4,7) Nevertheless, the limitations of most studies are retrospective designed. By using this method, signs and symptoms of ACS must be closely monitored while the patient's abdomen is being closed in the operating room. After finishing the closure, bladder pressure should be measured every 4 hours.^(5,7,8)

The authors used simple interrupted retention sutures in conjunction with skin-only suture to hold both sides of the fascia loosely. Retention suture was used in high-risk patients for midline incisional wound dehiscence. This approach prevents development of lateral fascial and abdominal musculature retraction by maintaining constant fascial tension without the edges of the fascia disruption. Others reported the use of retention suture as TAC in the case of bowel edema which definitive fascial closure was technically not possible. When bowel edema is resolved, retention suture may be sequentially tightened until the fascial edges are opposed.^(10,11)

In conclusion, abdominal wall closure is important to prevent intraabdominal infection. Skin-only closure is an alternative temporary closure technique being used in the case of bowel edema when the fascia cannot be sutured. This approach should be used when the abdominal skin is intact and

there is no skin tension after suturing. The wound care is simple, however, ACS might occur. Close observation of signs and symptoms of ACS have to be done after abdominal wall closure. When ACS develops, sutures must be stitched off and decompressive laparotomy is performed, followed by other methods of abdominal closure at the end of relaparotomy.^(4 - 6, 8, 9)

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