

외상성 횡격막 탈장을 통한 신장손상

— 1예 보고 —

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Traumatic Complete Renal Avulsion Herniating into the Left Pleural Cavity

— A case report —

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Herniation of the kidney through a traumatic diaphragmatic rupture in itself is rare. However, complete avulsion of the renal pedicle implies not only a more rare event, but also a surgical emergency. We report a case of a patient with complete avulsion of renal vessels and ureter of an intrathoracic kidney herniated through a diaphragmatic rupture caused by blunt trauma. Prompt diagnosis with a computer tomographic scan and immediate surgery saved the patient's life.

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Key words: 1. Diaphragm
2. Diaphragm, Trauma
3. Kidney

CASE REPORT

A 42-year-old man had fallen off of and got run over by a tractor. He arrived at our hospital 30 minutes later with an initial blood pressure of 120/80 mmHg, pulse 84/min, and respiratory rate at 36/min. The patient had complaints of chest wall pain and low back pain. The patient's plain films had shown multiple rib fractures with right hemopneumothorax and suspected left diaphragmatic rupture. The patient then had shown signs of respiratory failure 40 minutes later and the patient was intubated and put on artificial ventilation. The patient had presented hematuria and his initial BUN and creatinine levels were 31 mg/dL and 1.4 mg/dL, respectively.

Computer tomographic scans of the chest had shown left diaphragmatic rupture, intrathoracic kidney and gastric herniation into his left thoracic cavity (Fig. 1). A chest tube was placed into his right chest due to traumatic hemopneumothorax and because of nonvisualization of his herniated kidney and stomach and significant bleeding (hemoglobin level dropped from 13.3 to 6.7 g/dL), a decision for an emergency operation was made.

The patient was placed in a supine position and an upper median abdominal incision was made with extension laterally from its midportion in a "T" configuration. The completely avulsed left kidney was found separated from the renal artery, renal vein, and ureter and was found herniated along with his

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본 논문의 저작권 및 전자매체의 지적소유권은 대한흉부외과학회에 있다.



Fig. 1. Chest computer tomographic scan shows herniation of his stomach and kidney through a ruptured diaphragm. Non-enhancement of his kidney is noted.

spleen and stomach through a 10-cm rupture in the posterolateral portion of the diaphragm. There was active bleeding from the lacerated spleen. The stomach was delivered into the abdomen, splenectomy performed, and the nephrectomized intrathoracic kidney was removed. Proximal renal vessels and ureter were ligated and the rent in the diaphragm was closed with heavy interrupted silk sutures.

Massive transfusion was necessary (31 pints of pack cell blood) and weaning from artificial ventilation was possible on his postoperative 3rd day. His BUN and creatinine levels had peaked at 132 mg/dL and 6.4 mg/dL on postoperative 1 week, most likely due to ischemia caused by a hypovolemic episode during the operation. The patient had developed acute oliguric renal failure, but fortunately, he had recovered and was discharged at his postoperative 54th day. His BUN and creatinine levels had reached normal levels of 13 mg/dL and 1.1 mg/dL one week before discharge. The patient is doing well at outpatient follow up, 4 years after the incident.

DISCUSSION

Visualization of the kidney in the chest immediately after trauma is an indication of an emergent open procedure in itself. Renal pedicle injuries occur in 3% of patients with renal trauma. The renal artery is short and would not permit

migration of the kidney as a result of trauma[1]. In fact, preservation of the renal artery in itself would suggest an intrathoracic kidney of congenital origin.

Acute deceleration injury is the most common cause of blunt renal vascular trauma and renal artery disruption would result in kidney infarction, unless early restorative surgery is successful[2]. In our review of the English literature, we have found only 3 other cases of complete renal avulsion and herniation into the chest due to blunt trauma and in no such case was any attempts at renal revascularization or autotransplantation conceived[3-5].

Avulsion of the renal vascular pedicle may be extremely difficult to identify and has high mortality rates[2,4]. Prompt diagnosis can be extremely difficult. Hematuria on initial findings occurs in only 28~36% of patients with occlusion of the renal vessels[5]. Among the total of four cases (including ours) with complete renal avulsion and herniation into the chest, our case was the only case that presented hematuria. Diaphragmatic rupture rarely occurs alone and is associated with other injuries in approximately 75% of patients [4]. Associated injuries in our case included a herniated stomach and spleen. Diaphragmatic rupture may be easily missed and may delay diagnosis in up to 17% of the cases [6]. Radiologic signs of diaphragmatic rupture include abnormally elevated diaphragm, unclear diaphragmatic borders and abnormal gas pattern, suggesting herniation of intestinal loops into the chest[4]. In our patient, his left diaphragm on his initial chest x-rays was elevated and bowel gas was seen suggesting possible diaphragmatic rupture. Non-enhancement of the kidney on abdominal computer scans is evidence of a renovascular injury[7] as was seen in our case. The posterolateral portion of the diaphragm is the most common site of blunt rupture[8]. All of the four cases occurred in the posterolateral portion of the diaphragm, two on the left side and two on the right.

In the absence of intrathoracic organ injury, an abdominal approach is the preferred approach[4,8]. In our case, an extension of a median abdominal incision was done to facilitate exposure. An intravenous pyelogram or renal arteriogram would aid in the diagnosis if time should permit, which was not the case in our patient. Associated injuries may mask diagnosis, thus, prompt diagnosis and emergent surgery are a must to allow for patient survival.

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=국문 초록=

외상으로 인한 횡격막 파열과 그로 인한 신장 이탈은 드문 현상이며, 더욱이 신장 이탈시 신장 다리 (renal pedicle)가 완전히 찢어지는 현상은 매우 드물게 발생하며 응급 수술을 시행하지 않으면 생명이 위험할 수 있다. 이에 저자들은 외상성 횡격막 파열과 함께 흉강 내 혈관과 요관이 완전히 찢어진 상태로 신장이 탈출한 1예를 경험하였기에 간단한 문헌 고찰과 증례를 보고하는 바이다.

- 중심 단어 : 1. 횡격막
2. 횡격막 외상
3. 신장