

Page kidney after botulinum toxin injection during chiropractic care

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Page kidney refers to the phenomenon of hypertension secondary to long-standing compression of renal parenchyma caused by renal subcapsular collection. The most common cause of renal subcapsular collection is a hematoma which usually occurs after a history of blunt trauma. A 42-year-old female patient who received botulinum toxin injection in her back during chiropractic care was admitted to the emergency room with sudden bilateral flank pain and hypertension. The computed tomography (CT) images demonstrated the presence of bilateral subcapsular renal hematoma. The patient was treated conservatively and recovered well. The follow up CT images showed markedly resolved bilateral hematoma.

Keywords: Page kidney; Secondary hypertension; Chiropractic; Procedure of botulinum toxin injection

INTRODUCTION

Page kidney refers to the phenomenon of hypertension secondary to long-standing compression of renal parenchyma caused by renal subcapsular collection, such as hematoma, tumor, seroma, or urinoma [1]. Compression of the renal parenchyma results in compression of the renal vessels, which leads to renal hypoperfusion, ischemia, and activation of the renin-angiotensin-aldosterone (RAS) system [2]. Activation of the RAS results in a rise in blood pressure (BP) and arterial hypertension. Renal failure, in addition to hypertension, may occur in case of bilateral kidney injury, single functional kidney or a diseased contralateral kidney [3].

Renal subcapsular hematomas are usually located between renal parenchyma and the fibrous capsule, and most patients with renal subcapsular hematoma have a remote history of blunt trauma to the abdomen or back. However, penetrating wound related to gunshot or stabbing injury or malignancy such as renal cell carcinoma or angiomyolipoma could cause

renal subcapsular hematoma and Page kidney, too [4]. We experienced a case of Page kidney following penetrating bilateral renal injury by botulinum toxin injection during chiropractic procedure.

CASE

A 42-year-old female patient was admitted to the emergency room with sudden bilateral flank pain, nausea, vomiting, and chilling sense. She had been treated at a chiropractic clinic with a 2-month history of lower back pain. There, she had undergone physical therapy including botulinum toxin injection in her back 3 days ago. She did not have hypertension or any medical problem except for the history of hysterectomy because of cervical cancer over 15 years ago.

On admission, BP was 160/110 mmHg, heart rate 72/min, respiration rate 20/min, and body temperature was 37.9°C. On physical examination, tenderness in bilateral costovertebral angles was noted but other findings were not remarkable. Laboratory findings on admission showed the following levels: urine specific gravity, 1.004; urine blood, 2 positive; serum hemoglobin, 11.7 g/dL; blood urea nitrogen (BUN), 44.1 mg/dL; creatinine, 1.56 mg/dL; sodium, 130 mEq/L; potassium, 3.7 mEq/L; lactate dehydrogenase, 309 IU/L, creatinine kinase 58 IU/L.

Because bilateral flank pain, hematuria, and mild fever were started after receiving botulinum toxin injection, we per-

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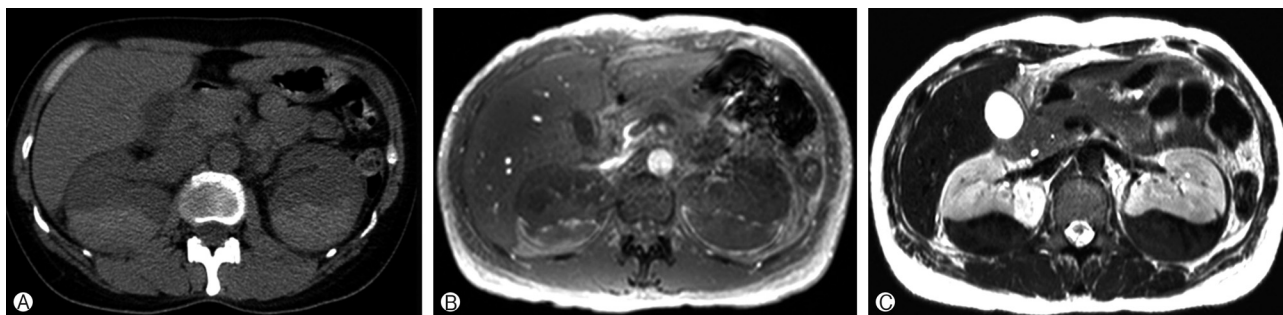


Fig. 1. Cross-sectional images from non-contrast computed tomography scan (A), T1-weighted (B), and T2-weighted magnetic resonance image (C) images of the abdomen, showing extensive bilateral posterior subcapsular hematoma with perirenal stranding.

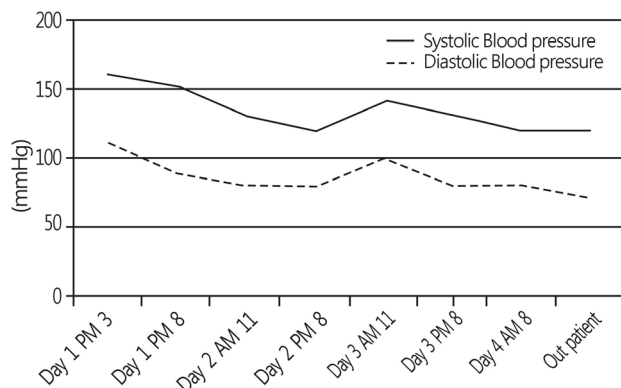


Fig. 2. The trend of blood pressure after admission.

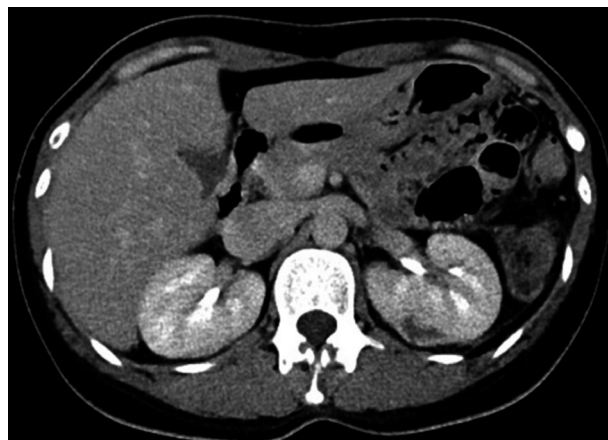


Fig. 3. At the 3-month follow-up evaluation, markedly improved bilateral subcapsular hematoma was observed on contrast-enhanced computed tomography scans. Only scanty hematoma remained at the left kidney.

formed computed tomography (CT) of the abdomen for evaluation of intra-abdominal organ injuries. However, we only performed unenhanced CT scan because of elevated serum creatinine level, and it showed large subcapsular perinephric hematomas at bilateral kidneys (Fig. 1). The patient was admitted to the nephrology department and conservative management was recommended with pain control. Approximately 2 days later, BP was stabilized to 110/80 mmHg without any anti-hypertensive medications (Fig. 2). After 2 weeks of hospitalization, bilateral flank pain was much improved and laboratory markers related to renal injury were also improved: hematuria disappeared and serum BUN and creatinine levels became normalized (12.6 mg/dL; 0.51 mg/dL, respectively).

Three months later, repeated imaging of the kidneys performed with contrast enhanced CT (Fig. 3) showed markedly resolved bilateral hematoma and only scanty bilateral posterior subcapsular hematomas remained at the left kidney.

DISCUSSION

Since Page kidney was first described on clinical grounds

in 1955 by Engel and Page, numerous cases of Page kidney have been reported. The classic presentation consists of hypertension in the presence of a perinephric subcapsular hematoma. As a subcapsular hematoma usually occurs after a history of blunt trauma, the lesion is usually unilateral [5]. The current case report illustrates an unusual presentation of a Page kidney with bilateral subcapsular hematoma developed after botulinum toxin injection during chiropractic care. To the best of our knowledge, this is the first case of Page kidney associated with botulinum toxin therapy as a muscle relaxant.

According to a recently published review of Page kidneys, the leading causes of Page kidney have changed over time [6]. Before 1991, most cases of Page kidney were related with a history of blunt injury with sports-related trauma or non-sports trauma. More recently, however, Page kidneys have been associated with penetrating renal injury developed after an invasive procedure, such as renal biopsy. Interestingly, the

majority of cases occurred in transplant kidney biopsy. In our study, the Page phenomenon developed immediately after botulinum toxin injection at a chiropractic center. The patient might be treated with needle injection with botulinum toxin injection because of lower back pain. The needle injection used in chiropractic practice is an invasive procedure in which an acupuncture needle is inserted into the skin and muscle [7]. It can also be used with other physical therapy interventions. According to the patient the needling was done at least 2 times at quadratus lumborum muscle area bilaterally using an approximately 10 cm long needle, which could harm kidneys considering her body size. Both kidneys showed subcapsular hematomas and the bilateral involvement may be associated with acute renal dysfunction in our patient, in conjunction with acute hypertension.

Hypertension with Page kidney has generally been ascribed to results from renal hypoperfusion and microvascular ischemia from external compression of the kidney, and subsequent activation of the RAS system. However, a previous animal study which created Page phenomenon by wrapping rat kidneys in cellophane showed that increase in BP was due to tubulointerstitial inflammation rather than angiotensin II activation [8]. Although renal biopsies in patients with Page kidney are not routinely performed in clinical practice, there are no available studies on the tubulointerstitial changes in human. Further studies on the pathogenesis of acute hypertension with Page kidney are needed.

When Page kidney is suspected, the best imaging modality is CT with contrast. It allows staging and an assessment of the contralateral kidney [9]. In CT images the Page kidney shows attenuated contrast enhancement of the kidney.

Therapeutic approaches to treatment of Page kidney have changed, too. In the past, surgical management, radical nephrectomy or open surgery for removal of a hematoma, was a definite management of patients with Page kidney [10]. However, recent reports have shown a trend toward less invasive treatment. Conservative treatment is the main therapeutic method, however, if the hematomas are not properly absorbed, percutaneous drainage of hematoma or endoscopic

intervention is recommended because the rate of kidney loss is higher with surgical intervention [11]. Surgical management is only undertaken in life threatening circumstances. Medical management may also be helpful. As RAS activation is the main cause of hypertension, use of either an angiotensin-converting enzyme inhibitor or an angiotensin receptor blocker is an effective treatment for hypertension. However, in our case, the patient did not receive any treatment with RAS blocker as BP stabilized only with pain control.

In conclusion, our case of Page kidney was related to needle injury that occurred during chiropractic therapy. Therefore, although the portion is low, it seems reasonable to have deep concern regarding penetration injury whenever using needles.

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