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CASE REPORT

Renal artery thrombosis as a result of blunt abdominal trauma

Vasileios Klapsis, Konstantinos Bouropoulos, Nikolaos Ferakis, Iraklis Poulia
Department of Urology, Hellenic Red Cross Hospital 'Korgialeneio-Benakeio', Athens, Greece

Abstract

Complete renal artery occlusion is a very rare complication of blunt abdominal trauma. An optimal treatment of this injury has not been well established. We report a case of an isolated renal artery thrombosis in a young man following a motor vehicle accident.

Introduction

Complete renal artery occlusion is a very rare complication of blunt abdominal trauma. Less than 400 cases have been reported in the literature. It was initially described by Von Recklinghausen in 1861. The optimal treatment of this injury has not been well established. There are three therapeutic options: immediate surgical revascularization, percutaneous revascularization and conservative treatment.

Case Report

A 34-year-old male was admitted to the hospital after a motorcycle accident. He was transported to the hospital 1 hour after the accident. On arrival at the emergency department the patient complained of left flank and left femoral pain. Physical examination revealed a systolic blood pressure of 80 mm Hg, a heart rate of 98 beats per minute and a respiration rate of 18 breaths per minute. He had contusions extended from his left flank to the iliac region. He also had a large hematoma in his left thigh. Focused assessment with sonography for trauma (FAST) was negative and he had no other indication for immediate laparotomy. His hemoglobin was 10.5 gr/dl. X-ray films revealed a left femoral fracture. Enhanced computed tomography scans (CT) were obtained from the chest to the pelvis after hemodynamic stabilization. There was a normal contrast uptake from the right kidney but no uptake from the left kidney, although no damage of the left renal parenchyma was observed (Figure 1). Subsequently arteriography was performed in order to evaluate the left renal artery, which revealed a total occlusion of the vessel about 3 cm from the aorta (Figure 2). Conservative management of this injury was decided and an external fixation of the femoral fracture was applied. CT scan two days later demonstrated a limited contrast enhancement in the inner side of the upper pole of the right kidney (Figure 3).

Discussion

The complete traumatic renal artery occlusion is a

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very rare condition. According to the literature its incidence is lower than 0.1% among patients with blunt abdominal trauma\(^1,3\). The left side is reported to be slightly more prone to injury\(^4\). Its occurrence requires a high velocity blunt trauma and the vast majority of the patients have other life threatening associated injuries, the treatment of which takes a priority. The main injury mechanisms are acceleration/deceleration trauma or direct impact trauma. Intimal tear followed by subintimal dissection, thrombosis and compression of the renal vessels between the anterior abdominal wall and the vertebral bodies are the two suggested associated causes\(^1\).

The physical examination is not sensitive in establishing the diagnosis of a renal artery occlusion. Computed tomography scan is the study of choice. Although the condition is rare, its incidence is been increasing due to the use of CT in the evaluation of abdominal trauma. A high index of suspicion together with high quality imaging is necessary for early detection. The management of traumatic renal artery occlusion remains controversial and no generally accepted treatment has been established. In the literature the following treatment options have been described: immediate surgical revascularization, percutaneous revascularization and conservative treatment\(^1-4\). Complications of an infracted kidney include delayed development of hypertension or infection.

In the acutely obstructed normal kidney angiography will not usually demonstrate collateral flow. However, after several days collateral circulation is developed. This circulation is from lumbar, adrenal, intercostals, gonadal and ureteric vessels\(^5\). In our case three days after the injury CT showed a small region of contrast enhancement in the inner renal side.

In the past the treatment of choice described in the literature was the surgical revascularization. The procedures include thrombectomy with vein patch angioplasty, excision of the thrombosed segment and end - to - end anastomosis, aortorenal bypass and autotransplantation\(^1\). The main purpose of revascularization is to preserve sufficient renal function and prevent renovascular hypertension. The crucial factors for successful revascularization are the time of warm ischemia and the extent of the
vessel lesion. An accepted time of warm ischemia used to be 4 hours but a multicenter study of the Western Trauma Association showed that the outcome in terms of prevention of the renal function of these patients was not better than those who were treated later. Haas et al, have reviewed the literature and identified 139 patients with unilateral renal artery occlusion. Surgical revascularization was attempted in 34 patients and was successful in 9 (26%). 67% of these patients had decreased renal function at a mean follow up of 1.8 years and 12% experienced hypertension at a mean 3.1 years follow up. The poor outcomes of this technique, even when surgeons report it to be technically successful may be due to the presence of peripheral thrombi which are undetectable during the operation. Another drawback of this therapy option is that the majority of the patients have other life threatening injuries, the management of which takes priority. Revascularization is indicated in patients with bilateral lesions and in those with solitary kidney.

Renovascular hypertension remains a major concern with the conservative approach. Rates of hypertension in blunt renal artery patients range from 3 to 30% in different series. The hypertension is mediated via renin hypersecretion from the affected kidney and may normalize spontaneously, or may be controlled medically or progress to severe hypertension that necessitates delayed nephrectomy. Haas CA et al, reviewed retrospectively treatment outcomes and complications of 12 patients (13 injuries). Seven patients did not have revascularization and none of them experienced immediate complications. 5 of 12 underwent surgical revascularization and one of them required nephrectomy because of the inability to restore arterial flow, 3 had no renal function and 1 had 9% of renal function in postoperative renal scan. Hypertension was developed in 3 patients who required nephrectomy for blood pressure control at a mean 5 months after injury.

Another treatment option with recently growing interest is the percutaneous revascularization with endovascular stent placement in stable patients, first described from Whigham et al, in 1995. There are still no adequate data in the literature in order to evaluate the long-term results of this method. Abu - Gazala et al, have reviewed the literature, identifying 14 patients with blunt renal artery injury treated endovascularly. Of these patients, 4 had complete renal artery stenosis. Two of those had markedly reduced renal function as shown in DTPA scan, and two of them developed renovascular hypertension, necessitating delayed nephrectomy in one of them. Kushimoto et al. have reported a case of a patient treated with endovascular stent placement and simultaneous suction of peripheral thrombi and thrombolysis with urokinase, followed by selective continuous heparinization. The need to administer anticoagulant factors in trauma patients in order to ensure the stent patency is a major drawback of this technique.

Conservative treatment is indicated in unilateral cases with the presence of a normal contralateral kidney. Jawas et al, have suggested a treatment algorithm for traumatic renal artery occlusion, suggesting conservative approach of stable patients with unilateral lesions, whether they have indication for immediate laparotomy for other associated injuries or not. About 25 - 50% of these patients will develop hypertension. It may controlled medically or progress to severe hypertension. Among the 147 conservatively treated patients reviewed by Haas et al., hypertension developed in 34 (32%) and was present by a mean of 97 days postinjury. Delayed nephrectomy is reserved for those with drug-resistant hypertension or in order to prevent infection of the necrotic tissue.

In conclusion, traumatic renal artery occlusion in trauma patients is a rare condition, the optimal treatment of which has not been yet established. Revascularization seldom results in a successful outcome. Patients who were managed conservatively must have close follow up for hypertension.
Περίληψη
Η πλήρης απόφραξη της νεφρικής αρτηρίας είναι μια σπάνια επιπλοκή αμβλείας κάκωσης της κοιλιάς. Η ιδανική θεραπεία αυτής της κάκωσης δεν έχει ακόμα καθιερωθεί. Αναφέρουμε μία περίπτωση θρόμβωσης της νεφρικής αρτηρίας σε νέο άνδρα μετά από τροχαίο ατύχημα.

References