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Is age a predictor for the development of hypertension in conservatively managed unilateral renal artery occlusion secondary to blunt abdominal trauma?

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A B S T R A C T

Objective: To present 2 cases with unilateral renal artery occlusion after blunt trauma conservatively treated and review, in the literature, the role of age as a prognostic factor for the development of hypertension.

Material and methods: A 14 and 12 y/o male and female passengers, who were unrestrained in the back seat of a car, were involved in different motor vehicle accidents. Both remained in the seat and arrived at the Pediatric Emergency Department with normal vital signs. Computerized tomography scans showed unenhancing kidneys. Conservative management was advocated.

Results: After 38 and 36 months follow-up, respectively, normal renal function and arterial pressure. We found only 7 cases in the literature where age ≤ 16 was reported and treatment was conservative. Nine in total, hypertension developed in 2(22%).

Conclusions: No conclusion could be made with such a small sample. There is enough evidence in the literature supporting conservative management at all ages.

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¿Es la edad un factor predictor en el desarrollo de hipertensión en pacientes con oclusión unilateral de la arteria renal secundario a trauma abdominal contuso que fueron tratados conservadoramente?

R E S U M E N

Objetivo: Presentar 2 casos de oclusión de la arteria renal unilateral secundario a trauma abdominal contuso manejados conservadoramente y revisar, en la literatura, el rol de la edad como factor predictor en el desarrollo de hipertensión.

Material y métodos: Masculino y femenina de 14 y 12 años, respectivamente, participaron en accidentes automovilísticos diferentes sin portar cinturón de seguridad

Palabras clave:

Obstrucción de la arteria renal

Trauma contuso

Hipertensión renovascular

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permaneciendo en el asiento. Ambos arribaron a urgencias pediatría con signos vitales normales. Ambas tomografías revelaron riñón sin captación de contraste. El manejo fue conservador.

Resultados: Posterior a 38 y 36 meses de seguimiento, respectivamente, ninguno presenta hipertensión o daño en la función renal. Encontramos solo 7 casos, en la literatura, con edad ≤ 16 manejados conservadoramente. En total 9, existió hipertensión en 2 (22%).

Conclusiones: No se puede llegar a una conclusión contundente con una muestra tan pequeña aunque existe evidencia suficiente que soporta el manejo conservador del padecimiento a cualquier edad.

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Introduction

Occlusion of the renal artery (ORA) is a rare complication of blunt abdominal trauma. Renal function (RF) is rarely restored after revascularization. As a result, the optimum approach to treatment has been the subject of controversy. Other treatment options are nephrectomy and conservative management.¹⁻³ Hypertension (HT) is often seen over follow-up. ORA in patients aged 16 years or younger is very rare, and there is no information on the incidence of HT in this age group. The present study describes two cases of unilateral ORA secondary to blunt trauma, subjected to conservative management in our Pediatric Emergency Care Department, and a literature review is made of the role of age as a prognostic factor of HT in the conservative treatment of this pathology.

Material and methods

Clinical cases

Case 1. A 14-year-old male suffered a traffic accident while sitting without a seatbelt in the back seat of an automobile. The patient remained in the backseat and was conscious at the time of arrival of the paramedics. The accident occurred in a rural area, and transfer to the Pediatric Emergency Care Department took approximately 90 minutes. The patient was transferred with a collar and immobilized in dorsal decubitus on a protective table. The vital signs upon admission were: temperature 36.5°C, pulse 84 bpm, blood pressure 110/63 mmHg, respiratory frequency 14 rpm. Physical examination in the Department revealed mild abdominal pain and abrasions on different parts of the body. Initial abdominal ultrasound and the X-ray study only revealed rectification of the cervical spine. Laboratory tests: normal hemoglobin and creatinine values. Urine tests: microhematuria. A few hours later the patient presented signs of hemothorax and continued to suffer abdominal pain. A left-side chest drain was placed and a CAT study with contrast injection was carried out. At CAT evaluation, the case was commented in our Department. At this point the patient had been under observation for 8 hours. The evaluation revealed left flank ecchymosis and scant output from the chest drain. The CAT scan showed

no contrast uptake in the left kidney (fig. 1), and a small splenic hematoma was noted. Conservative management was decided. Discharge took place 6 days later.

Case 2. A 12-year-old female suffered a traffic accident while sitting without a seatbelt in the back seat of an automobile. The patient remained in the backseat and was conscious at the time of arrival of the paramedics. The patient was transferred with a collar and immobilized in dorsal decubitus on a protective table. Admission to the Pediatric Emergency Care Department took place about 15 minutes after the accident. The vital signs upon admission were: temperature 36.4°C, pulse 76 bpm, blood pressure 109/69 mmHg, respiratory frequency 14 rpm. The patient remained calm and very cooperative, and only complained of mild abdominal pain at physical examination in the Department. Initial abdominal ultrasound and the X-ray study proved normal, in the same way as the laboratory (blood and urine) tests and the rest of the physical examination. We decided

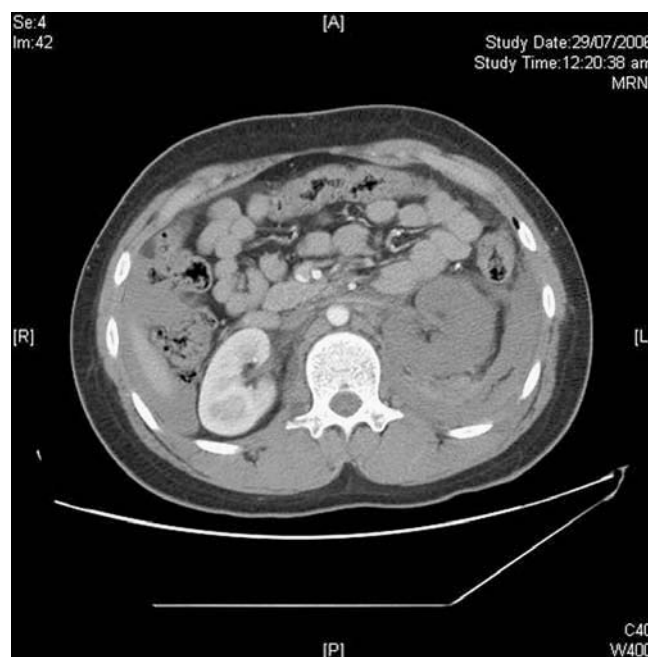


Figure 1 – AT with contrast injection showing the lack of uptake in the left kidney.



Figure 2 – CAT with contrast injection showing the lack of uptake in the right kidney.

to keep the patient under observation. A few hours later the patient continued to experience mild abdominal pain, and a CAT study with contrast injection was carried out. At CAT evaluation, the case was commented in our Department. At this point the patient had been under observation for 5 hours, under stable conditions. The CAT scan showed no contrast uptake in the right kidney (fig. 2). Conservative management was decided. Discharge took place after 36 hours under observation.

We reviewed 106 English-language articles (references not shown), searching for patients aged 16 years or younger, with unilateral ORA subjected to conservative management.

Results

After 38 and 36 months of follow-up (case 1 and 2, respectively), there are no signs of HT or alterations in renal function. The cases found in the literature totaled 9 cases, of which two (22%) developed HT.

Discussion

Occlusion of the renal artery (ORA) is a rare disorder, though its diagnosis has become more common in recent years thanks to the increased use of CAT for the evaluation of abdominal trauma.⁴ The condition is associated with acceleration / deceleration events, and in 80% of the cases other organs are also affected.⁵ The underlying mechanism of action involves compression of the renal artery against the vertebral bodies of the spine, giving rise to intimal damage of the vessel and thrombosis.^{2,4} ORA is more common in the left artery and in individuals under 25 years of age, and bilateral involvement is extremely rare.⁶ The data generated by the physical examination are insufficient to establish a diagnosis. Flank bruising, proteinuria or hematuria may be observed, but are often nonspecific.⁴ One of our patients had flank bruising, while the other patient

showed no objective clinical signs. CAT is the diagnostic technique of choice, with a precision of up to 98%.⁷ ORA is suspected when a “darkened” kidney is seen on the contrast CAT scan. This image corresponds to the lack of intravenous contrast uptake.

The incidence of ORA in patients under 16 years of age is 10-30%.^{8,9} On considering our two cases with over three years of follow-up and with normal physical examination and blood pressure findings, we suggest that age may be a prognostic factor for the development of HT. On examining the literature, conservative management was seen to be little used before the 1990s. At that time surgery was very popular, and some authors even performed “preventive nephrectomies”. Since then, however, conservative management has gained popularity.

Some articles found in the literature were over 30 years old. Many things have changed since then in medical practice, in the management of shock and trauma patients, and in radiology. Furthermore, patient age is regularly not mentioned, particularly in the larger patient series – thus making review of the subject difficult.^{4,6,8}

Two patients (22%) developed HT in the reviewed literature. According to some series, HT appears in up to 50% of the cases, particularly within the first year (96 days on average).⁶ Unfortunately, since ours was a retrospective analysis, not all the patients were subjected to the same follow-up, and one study even failed to mention follow-up; as a result, reliable comparisons cannot be made. In the larger patient series it would be interesting to examine the correlation between patient age and the development of HT, with a view to corroborating our hypothesis and the findings obtained. We consider the reason why some patients develop HT while others do not to be related to a number of factors inherent to each subject, such as age, and that the development of HT in older individuals is due to the existence of some vascular disorder already present before the time of trauma. This review and case presentation supports the algorithm of Jawas et al., according to which conservative management should be indicated in patients with unilateral ORA and a normal contralateral kidney.³ We suggest that this criterion is equally applicable to children and adolescents. Normal renal function is rarely restored, even when surgery is carried out less than 6 hours after the causal traumatism.¹⁰ Haas et al. reported that even some patients in which unilateral revascularization proved successful posteriorly developed HT.⁶ This further supports the advisability of conservative management.

Conclusions

Firm conclusions cannot be drawn based on the small existing patient series. ORA is a rare condition – a fact that complicates the conduct of prospective and randomized studies. However, it would be interesting to examine the incidence of HT in different age groups in centers with large case series. There is sufficient evidence in the literature to propose the advisability of conservative management for ORA in patients of any age.

Conflicts of interest

The authors declare no conflicts of interest.

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