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CASE REPORT

Hybrid surgery as a new perspective for treatment of abdominal aortic aneurysm associated with a congenital pelvic kidney

Rui Machado, Diogo Silveira*, Paulo Almeida, Rui Almeida

Serviço de Angiologia e Cirurgia Vascular, Hospital de Santo António, Centro Hospitalar do Porto, Porto, Portugal

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Abstract The coexistence of an infra-renal abdominal aortic aneurysm (AAA) and a congenital pelvic kidney (CPK) is rare and there are only a few cases reported in literature, mostly treated by conventional open surgery. We present the first report of hybrid surgery as a successful and less invasive treatment for this association. A 75 year-old patient was referred to our department with a 5.7 cm diameter AAA and an ectopic right CPK vascularized by one artery, originated from the anterior wall of the aneurysm in the distal aorta. Treatment consisted in an ilio-renal bypass with autologous saphenous vein by a retroperitoneal approach, followed by the aneurysm endovascular aneurysm repair (EVAR) with an aorto-uni-iliac stent-graft, occlusion of left common iliac artery and ePTFE femoro-femoral crossover bypass. This procedure was simpler and less aggressive than a conventional surgery, with only 6 minutes of renal ischemia, which allowed preservation of the renal function and a faster recovery of the patient.

PALAVRAS-CHAVE
Rim pélvico ectópico;
Aneurisma aorta;
Cirurgia híbrida;
Endovascular;
EVAR

Cirurgia híbrida como uma nova perspetiva para o tratamento de aneurisma da aorta abdominal associado a rim pélvico ectópico

Resumo A associação de um aneurisma da aorta abdominal (AAA) e um rim congenitamente localizado na região pélvica é rara e, nos poucos casos existentes na literatura, o tratamento foi realizado por cirurgia convencional. Apresentamos a primeira descrição de tratamento desta associação, com sucesso e menor invasibilidade, por cirurgia híbrida. O caso reporta um doente de 75 anos, referenciado para o nosso Serviço com AAA de 5.7 cm de diâmetro e um rim direito ectópico, de localização pélvica, perfundido por uma artéria única originada na parede anterior

* Corresponding author.
E-mail address: diogo.slvr@gmail.com (D. Silveira).

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do aneurisma, na aorta distal. O tratamento consistiu em bypass ilio-renal com veia grande safena autóloga por abordagem retroperitoneal, seguido de exclusão endovascular do AAA com endoprotese aorto-uni-iliaca, oclusão da artéria iliaca comum esquerda e bypass femoro-femoral cruzado com prótese de ePTFE. Este procedimento foi mais simples e menos agressivo do que uma cirurgia clássica, tendo apenas seis minutos de isquemia renal, o que permitiu a preservação completa da função renal e uma recuperação pós-operatória mais rápida.

Introduction

A congenital pelvic kidney (CPK) associated with an infra-renal aortic aneurysm (AAA) is rare and there are only a few cases published in literature, mostly treated by conventional open surgery. The technical challenge of the treatment is to preserve the ectopic kidney function by minimizing its time of ischemia. We report a case of a CPK associated with an infra-renal AAA treated successfully and less invasibly by hybrid surgery.

Case report

A 75-year caucasian male, smoker, with hypertension, dyslipidaemia and family history of aortic aneurysms was referred to our department with an AAA diagnosed by routine ultrasound. Angio-CT revealed a 5.7 cm diameter (8.5 cm length) fusiform degenerative infra-renal AAA and a right CPK. Left kidney had a normal anatomy. The CPK was vascularized by only one artery originated from the anterior wall of the aneurysm in the distal aorta (Fig. 1). The aneurysm neck length was 2.5 cm (2.8 cm diameter). Left common iliac artery (LCIA) was tortuous, aneurysmatic, with a 75% calcified stenosis. Right common and external iliac arteries were normal.

By a right iliac arciform transplant incision and after exposure of the iliac vessels, a bypass between the external iliac artery and the CPK artery has been performed with autologous inverted saphenous vein. Proximal anastomosis was latero-terminal and the distal anastomosis was termino-terminal, with ligation of the native ectopic renal artery. Time of warm renal ischemia in this part of the procedure has been 6 minutes. Afterwards, by surgical cut-down of common femoral arteries, endovascular repair of the AAA was performed with an aorto-uni-iliac Endurant® stent-graft deployed through the right iliac axis, occlusion of left common iliac artery and a right to left femoral-femoral crossover bypass with 8 mm ePTFE. Our option for the mono-iliac endoprosthesis was due to the LCIA tortuosity with the 75% stenosis, which was calcified. The time of renal ischemia during EVAR was only of a few seconds during stent-graft ballooning. Final angiographic control showed no endoleaks and patency of the stent-graft and the ilio-renal and crossover bypasses. Post-operative CT confirmed this result (Fig. 2). Renal function remained stable during the post-operative period and has not been compromised (the maximum serum creatinine was 0.99 mg/dl) and the patient has been discharged five days after the procedure.

After three years of follow-up the patient remains asymptomatic, with a normal serum creatinine. Consecutive CT's showed patency of the ilio-renal and femoro-femoral crossover bypasses and no endoleaks, with an aneurysm diameter regression to 5.5 cm. The kidney sizes and morphology were unchanged.

Discussion

A pelvic kidney can exist after a transplant or by a congenital anomaly. A CPK is the rarest of the six types of renal ectopia. It occurs when embryological kidney fails to ascend during 4–8th weeks of gestation, and has an incidence of 1:2100–3000 births.[1] Arterial supply is generally anomalous and one or two arteries are common, arising from the distal aorta or iliac arteries. Kidney vascularization pre-operative assessment is essential to make an accurate planning.[2] Except for patients with solitary pelvic kidney, good results should be expected in the association of AAA repair, as there is a normal proximal kidney not at risk for injury.

Open conventional surgery is the commonest way of repair.[3] Exclusive endovascular repair is reported only in very few cases.[4,5] In open repair the main concern is to minimize the effects of renal ischemia, which can be achieved by using temporary shunts or bypasses, renal perfusion with cold solutions, pump oxygenators or surrounding the kidney with ice packs.[2,6] Even so, acute tubular necrosis is common after surgery, usually resolving within two weeks. Endovascular repair has been compared favorably to open repair[7] but it demands branched or fenestrated stent-grafts to preserve the anomalous vascularization of the kidney. This technology is not routinely available but, as new devices appear, it is expected a more widespread use.

However, in patients unfit for open repair or with an anatomic unfeasibility for endovascular repair alone, the combination of the two approaches – hybrid surgery – performed for the first time in 1999 by Quinones Baldrich to treat type IV thoraco-abdominal aneurysms[8] can be a less invasive treatment option. It has the advantage to minimize the time of ischemia submitted to the kidney of an open repair (only the time for the renal anastomosis) adding the

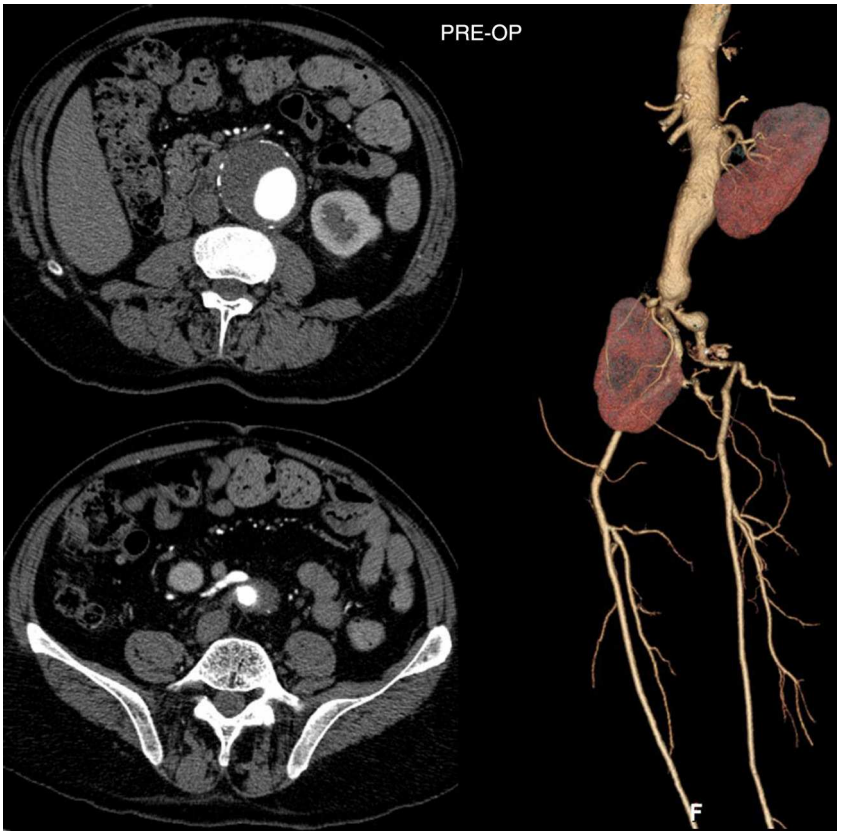

Figure 1 Pre-operative CT scan: ectopic right pelvic kidney vascularized by a single artery originated from the anterior wall of the abdominal aortic aneurysm.

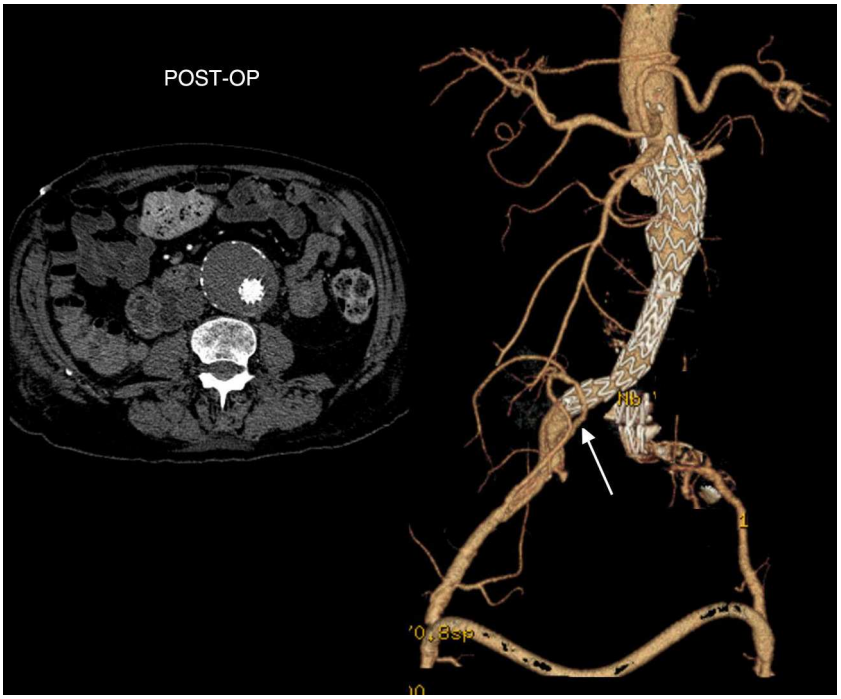

Figure 2 Post-operative CT scan: endovascular successful AAA exclusion, with patent ilio-renal (arrow) and femoral crossover bypasses.

benefit of the low invasiveness of an endovascular repair (without laparotomy or aortic clamping), and the possibility of usage of commercially available stent-grafts.

Conclusion

Hybrid surgery is simple, effective and non-aggressive technique to treat an AAA associated with abnormal congenital renal vascularizations, allowing shorter times of renal ischemia, a quicker recovery and hospitalization. As far as we are concerned this is the first reported case in literature of the treatment of an AAA associated with a CPK by this technique. We recommend its usage as a first line treatment for high-risk surgical patients. Still, more experience and comprehensive data are needed before it can be recommended as a first option treatment for all the cases.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

Conflicts of interest

The authors have no conflicts of interest to declare.

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