INTRAVENOUS DIGITAL SUBSTRACTION ANGIOGRAPHY VERSUS CONVENTIONAL ANGIOGRAPHY FOR EVALUATING LIVING RENAL DONORS

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SUMMARY

The angiograms of 40 nephrectomised donors operated at the Department of Urology, Hacettepe University Hospital, were evaluated retrospectively. It was found that in 84 % of donors who underwent intravenous digital subtraction angiography (IV-DSA) and in 76 % of patients who underwent conventional aortography and selective renal angiography (CA) the estimations for renal arterial anatomy preoperatively were correct. The accuracy of the two techniques for predicting the renal arterial status did not differ statistically. It was concluded that as IV-DSA is a non-invasive method, it should be the procedure of choice for evaluating living renal donors.

Key words: Angiography, Living renal donor.

INTRODUCTION

Renal angiography is an essential test for living renal donor candidates and is performed after the haemotologic, biochemical and immunologic investigations if no contraindications are discovered so far. By angiography, the number and length of renal arteries and the pathologic changes of aorta, renal artery and renal parenchma are investigated. Information obtained by angiography is important for deciding the eligibility of the candidate as a donor and the surgical approach to the appropriate side. In our study the angiographic findings of 40 nephrectomised donors were evaluated retrospectively and the findings were compared with the operative findings. Besides the sensitivity, the morbidity and complications of each technique were investigated.

MATERIALS AND METHODS

40 donors who underwent nephrectomy between March 1981 and February 1989 at Hacettepe University Department of Urology were included in the study. It was found that 21 of these donors had been evaluated by CA and for 19 donors IV-DSA had been performed.

All donors evaluated by CA were hospitalised one day before and prepared for the procedure. The technique employed was to catheterise the femoral artery and then aortography and selective renal angiography was performed by giving contrast material via the catheter. IV-DSA was performed by injecting the contrast material through an antecubital vein. 40 ml of contrast material was introduced for every patient at a rate of 20 ml/second. Images were obtained at intervals of 1 or 2 seconds.

The angiograms were evaluated retrospectively without knowing the operative findings of each donor.

For statistical analysis khi-square test was used.

RESULTS

The results of operative findings and result of IV-DSA and CA are illustrated in Table I. Among 40 donors 29 (72 %) were found to have a single renal artery, 3 (8 %) had two renal arteries and 8 (20 %) had accessory polar arteries along with a single renal artery.

Among 21 donors who underwent CA, 16 (76 %) had the same angiographic and operative findings. 15 of these donors had a single artery and 1 had two arteries. CA failed to show the accessory polar artery in 5 patients. The mean period of hospitalisation for donors who underwent CA was 3-4 days (range 3-7) and 2 of them had local hematomas at the femoral region which resolved by conservative measures.

In 16 of 19 donors who underwent IV-DSA the renal arterial status was estimated correctly (84 %). 14 of these donors had single arteries and 2 had multiple arteries. IV-DSA was unable to show the accessory polar arteries which were present in 3 of 19 donors.

It was found that both methods fail to demonstrate accessory polar arteries and the accuracy of each method does not differ significantly (Table II.)

DISCUSSION

Renal angiography is an indispensable and essential test for selecting appropriate donors as well as the surgical approach. Accurate assessment of angiographic findings preoperatively, directly effects the duration and quality of the lives of both renal transplantation recipients and donors. So, the method used for angiographic imaging should both be accurate and non-invasive.

Today, at most transplantation centers conventional angiography seems to be the widely used procedure, but with the improving computer technology IV-DSA is rapidly substituting the conventional method. In fact, both methods have advantages and disadvantages. CA has been claimed to be more accurate but it requires hospitalisation, it is not economic and also it is invasive. Hematoma, arteriovenous fistula, pseudoaneurisms, subintimal damage, embolisation and perforation are some of the complications that could be dangerous for the otherwise healthy donor. Also, a stenosis due to the spasm induced by the irritation of the catheter could be a misleading finding. In IV-DSA the poor breath-holding uncooperated patient, bowel motion and diminished cardiac output could lessen the accuracy of assessment. Because living renal donor candidates are always healthy adults, these disadvantages generally do not create any problem. Also some methods for decreasing intestinal peristaltism are frequently being used (1, 2).

In the literature there are a number of studies comparing the sensitivities of IV-DSA and CA. Hillman et al compared the IV-DSA findings of 11 donors with CA or operative findings and found that IV-DSA was unable to show accessory arteries only is 2 cases (3). Fleschner et al, in their series of 10 donors compared IV-DSA and CA and found a similarity except one case in which with IV-DSA an accessory artery was missed (4). McElroy et al found a 79 % rate of accuracy with IV-DSA when evaluating a series of 33 donors (5). In all these studies the authors recommend IV-DSA to be the procedure of choice for donor evaluation. Sussman et al found the sensitivities of IV-DSA and CA to be 89 % and 92 % respectively. In their study the difference was proven to be insignificant (8). IV-DSA has some difficulties to demonstrate accessory arteries in some cases but the same difficulty is also present for CA (6).

In our study both techniques were found to miss accessory arteries in all 8 cases but the sensitivities of the two techniques were proved to be similar. When the invasiveness of CA is taken into consideration it was concluded that IV-DSA should be the procedure of choice for evaluating living renal donor candidates.

Table I: The results of IV-DSA and CA, and operative findings.

	No.of donors	Single renal artery	Two renal arteries	Accessory polar artery
IV-DSA	19	14	2	—
CA	21	15	1	—
Operative findings	40	29	3	8

Table II: Comparison of the sensitivities for IV-DSA and CA.

	No.of donors	No.of correct estimations	(%)
IV-DSA	19	16	(84)
CA	21	16	(76)

$x^2 = 0.4$
$P>0.05$

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