

Estimated Creatinine Clearance by the Formula of Gault and Cockcroft in Renal Transplantation

I. Myara^a, F. Lahiani^a, C. Cosson^a, A. Duboust^b, N. Moatti^a

^aLaboratoire de Biochimie and ^bService de Néphrologie, Hôpital Broussais, Paris, France

Dear Sir,

The determination of creatinine clearance is used to assess a decrease in glomerular filtration. This requires the measurement of creatininemia and creatininuria, and the total collection of 24-hour urine. Because of the difficulty in verifying urine collection and the fluctuation of creatinine excretion, the value of creatinine clearance can be mistaken. Consequently, Gault and Cockcroft [1, 2] suggested the use of a formula for predicting creatinine clearance from only plasma or serum creatinine:

$$\text{creatinine clearance (ml} \cdot \text{min}^{-1}) = \frac{(140 - \text{age in years}) \times (\text{body weight in kg})}{72 \times \text{creatininemia in mg/100 ml}}$$

creatinine clearance

$$\text{(ml} \cdot \text{min}^{-1}) = \frac{(140 - \text{age in years}) \times (\text{body weight in kg})}{0.814 \times \text{creatininemia in } \mu\text{mol/l}}$$

and

creatinine clearance

$$\text{(ml} \cdot \text{s}^{-1}) = \frac{(140 - \text{age in years}) \times (\text{body weight in kg})}{48.8 \times \text{creatininemia in } \mu\text{mol/l}}$$

with 15% less in females.

The validity of this formula is, however, questioned [3-7]. In order to decide whether this formula can be useful in following up renal transplantation, we studied in the present work the creatinine clearance as estimated by the formula of Gault and Cockcroft in 59 kidney transplant recipients (33 males and 26 females; age: 38 ± 11 years, mean \pm SD). In parallel, creatinine clearance was also calculated from plasma and urine creatinine as measured by the Jaffé technique on an Astra-8 Beckman autoanalyzer.

Table I. Correlation between measured and estimated creatinine clearance ($\text{ml} \cdot \text{s}^{-1}$) by the formula of Gault and Cockcroft

Days after transplantation	n	y (measured) = b (estimated) + a	Coefficient of correlation
7	45	$y = 0.781x + 0.079$	0.773
14	43	$y = 1.220x - 0.130$	0.904
21	43	$y = 0.832x + 0.140$	0.746
28	35	$y = 0.898x + 0.110$	0.780

Correlation was calculated by linear regression analysis. There is a significant ($p < 0.001$) correlation for all the values.

As shown in table I, a good correlation was found between measured and estimated creatinine clearance. In addition, simultaneous determination of creatinine clearance by both methods clearly demonstrated (fig. 1) that the day to day variability of measured values was higher and that wrong values may thus be used. However, this does not preclude measured creatinine clearance from being useful because estimated creatinine clearance can be modified independently of glomerular filtration by hydric retention which alters the body weight of patients. Therefore, we think that creatinine clearance both measured and estimated by the formula of Gault and Cockcroft can be associated with improving the follow-up of renal function in patients with renal transplants.

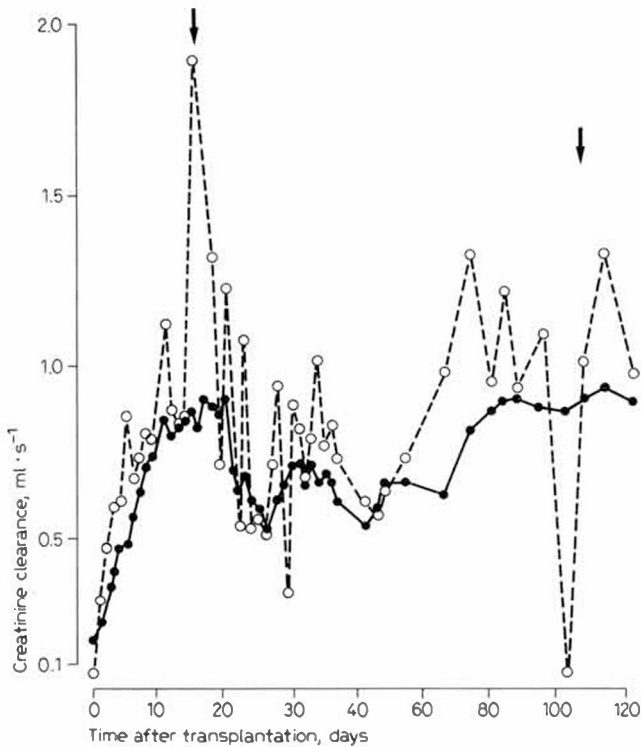


Fig. 1. Measured (○) and estimated (●) creatinine clearance in a patient after renal transplantation. The two arrows indicate a blatant mistake in the measured creatinine clearance.

References

- 1 Gault, M.H.; Cockcroft, D.W.: Creatinine clearance and age. *Lancet ii*: 612–613 (1975).
- 2 Cockcroft, D.W.; Gault, M.H.: Prediction of creatinine clearance from serum creatinine. *Nephron 16*: 31–41 (1976).
- 3 Durakovic, Z.: Creatinine clearance in the elderly. A comparison of direct measurement and calculation from serum creatinine. *Nephron 44*: 66–69 (1986).
- 4 Dubussche, X.; Lalau, J.D.; Doublet, P.; Decagny, B.; Westeel, P.F.; Arlot, S.; Quichaud, J.: La clairance de la créatinine du sujet âgé. Comparaison des résultats obtenus avec différentes méthodes d'évaluation. *Presse méd. 16*: 402 (1987).
- 5 Freysz, M.; Lafleur, J.C.; Guillard, C.; Lallemand, C.; Dupont, G.: Evaluation de la clairance de la créatinine chez le polytraumatisé. *Presse méd. 16*: 1201 (1987).
- 6 Deray, G.; Achour, A.; Cacoub, P.; Boumelou, A.: Creatinine clearance in chronic renal failure. Comparison of direct measurement and calculation from serum creatinine. *Nephron 47*: 74 (1987).
- 7 Drinka, P.J.: Estimating creatinine clearance from serum creatinine in chronically immobilized nursing home residents. *Nephron 47*: 310–311 (1987).

Dr. I. Myara
 Laboratoire de Biochimie
 Hôpital Broussais
 96, rue Didot
 F-75674 Paris Cédex 14 (France)