

Access Blood Flow Estimation (Qa_e)

Introduction

Access Blood Flow (Qa) measurement is a patient hemodialysis care recommendation. The aim of this study was to determine whether extracorporeal flow (Qb) is in correlation on Qa in patients undergoing hemodialysis.

Methods

This is a correlation study. Measurements were performed since September 29, 2016 to January 30, 2017 in the hemodialysis center of "José Carrasco Arteaga" Hospital. Cuenca-Ecuador. Sample calculation was 41 cases.

We included chronic renal failure patients over 17 years old with arteriovenous fistula. Participants signed informed consent. This study was approved by Universidad San Francisco de Quito ethics committee.

The variables were population descriptive, Qa and Qb . Qa measurement was performed with a Transonic® monitor.

Qb measurement was performed with following pressures in arterial line:

- 60 mmHg,
- 100 mmHg,
- 160 mmHg,
- 200 mmHg.

Spearman Coefficient correlation between Qa , and Qb standardized to a Dynamic Arterial Line Pressure (DALP).

SPSS 22.0 was used statistics analysis. The hypothesis was $R_{XY} \neq 0$.

Results

A total of 57 patients, age 62.9 ± 12.7 years, with 29.4 ± 33 months on hemodialysis participated in the study.
23 women (40.3%).
45.6% had Diabetic Nephropathy.

The presence of fistulas were 40 cases in the upper left limb (70.2%) and 17 (29.8%) in the upper right limb.

The prevalence of aneurysms was 10.5%.

In the studied group the 50th percentile of Qb was 415 mL / min with a DALP of -200 mmHg. (Figure 1).

The average access flow was 1516 ± 878 ml / min (Table 1).

The correlation between Qb and Qa is statistically more significant when DALP was -200 mmHg (Figure 2). The association has a coefficient $R_s = 0.643$ (IC 0.453 to 0.771) $P < 0.0001$.

The estimated flow of the access $Qa_e = (\text{pump } Qb \text{ DALP } -200 \text{ mmHg (mL / min)} * 16.63) - 5449.71$ (Table 2)

The concordance between Qa & Qa_e was obtained (Figure 3).

Conclusion

$$Qa_e = Qb^{\text{DALP}-200\text{mmHg}} * 16.63 - 5449.71$$

Where $Qb^{\text{DALP}-200\text{mmHg}}$ is the extracorporeal blood flow when the pressure at the arterial line is -200 mmHg.



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Krivitski NM, et al. Semin Dial. 2001;14(3):181-5. DOI: 10.1046/j.1525-139X.2001.00050.x
Tessitore N, et al. Nephrology Dialysis Transplantation 2008; 23(11): 3578-3584. DOI: 10.1093/ndt/gfn275

Figure 1. Box Plot, extracorporeal blood flow (Y) and Dynamic Arterial Line Pressure (X)

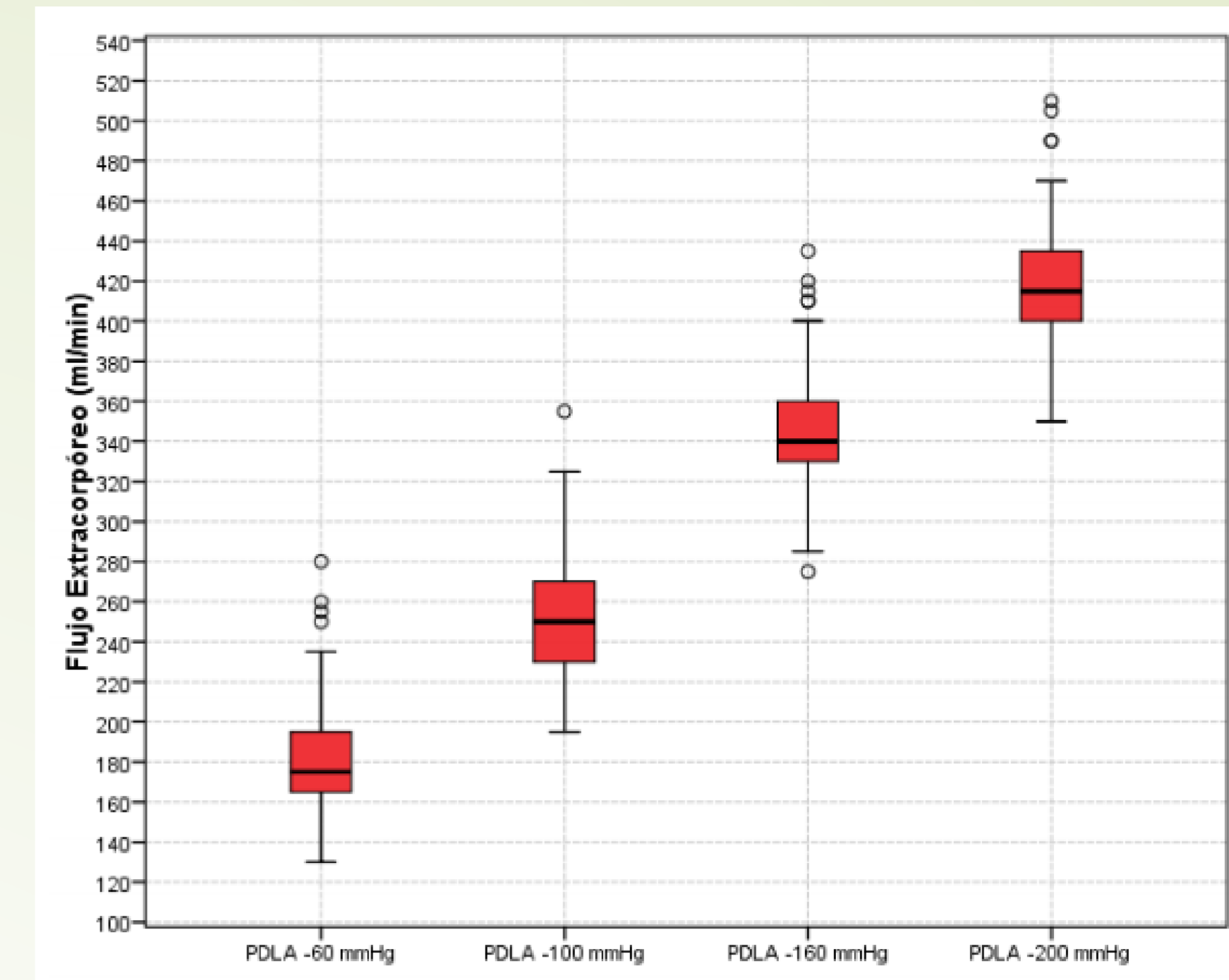


Table 1. Access Blood Flow measurements

Qa	Frecuencia	Porcentaje	Porcentaje acumulado
De 0 a 399 mL/min	2	3.5 %	3.5 %
De 400 a 800 mL/min	12	21.1 %	24.6 %
De 801 a 1516 mL/min	16	28.1 %	52.6 %
De 1517 a 2130 mL/min	13	22.8 %	75.4 %
De 2131 a 2944 mL/min	12	21.1 %	96.5 %
De 2945 a 4000 mL/min	2	3.5 %	100 %
Total	57	100 %	

Qa: Flujo del acceso. Percentil 5: 399 mL/min; Percentil 25: 800 mL/min; Percentil 50: 1516 mL/min; Percentil 75: 2130 mL/min; Percentil 95: 2944 mL/min.

Figure 2. Scatter plot between Access Blood Flow & Extracorporeal Blood Flow homologated to DALP-200 mmHg

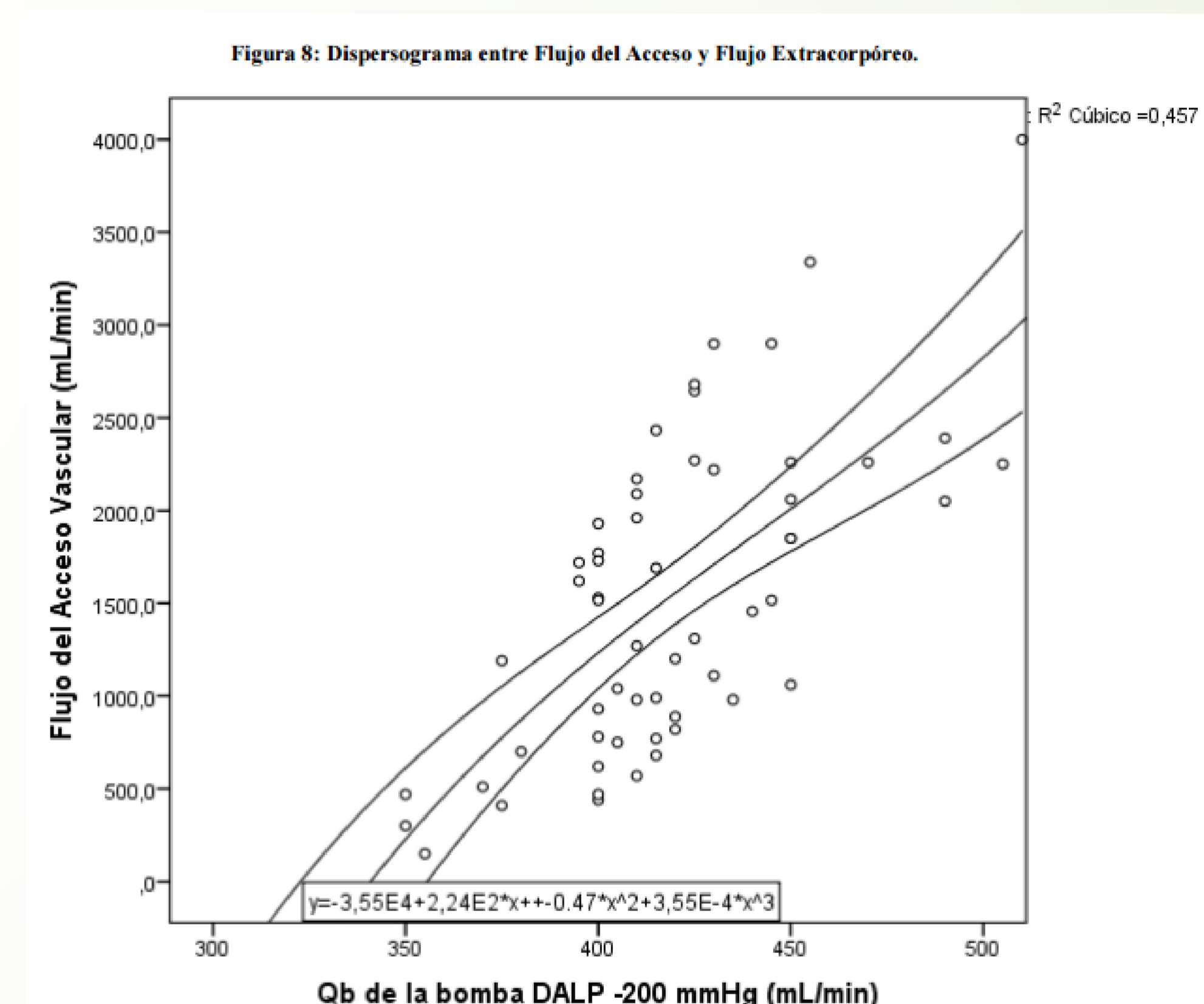


Table 2. Scatter plot between Access Blood Flow & Extracorporeal Blood Flow homologated to DALP-200 mmHg

Modelo 3	Coeficientes no estandarizados		Coeficientes estandarizados		T	Sig.	95.0% intervalo de confianza para B		Correlaciones		
	B	EE	Beta				LI	LS	Orden cero	Parcial	Parte
(Constante)	-5449.71	1032.58			-5.278	<0.0001	-7519.0	-3380.38			
Qb de la bomba PDLA -200 mmHg (mL/min)	16.63	2.46	0.674		6.768	<0.0001	11.71	21.56	0.674	0.674	0.674

PDLA: presión dinámica de la línea arterial

Figure 3. Bland & Altman Scatter plot Qa vs Qa_e

