

Lock Tunneled Catheters with Taurolidine-Citrate-Heparin Lock Solution Significantly improves inflammatory profile in Hemodialysis patients

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* During the last few years, switching from a catheter to an arteriovenous fistula has been shown to be associated with a substantial decrease in mortality risk¹. Some authors have demonstrated that, even in the absence of catheter-related infection, patients receiving hemodialysis through a catheter had significantly higher serum concentrations of C-reactive protein, suggesting that chronic inflammation could be the reason for their significantly higher mortality rate²⁻⁴. However, some patients are unable to have an arteriovenous fistula and therefore it is highly important to identify the mechanism through which catheters trigger a chronic inflammatory response even in the absence of clinically evident infection. Allon M et al.¹ *Am J Kidney Dis* 2006; Goldstein SL et al.² *Kidney Int* 2009; Al Saran K et al.³ *Ther Apher Dial* 2013 and Yeun JY et al.⁴ *Am J Kidney Dis* 2000.

* Taurolidine has activity against Gram-positive, Gram-negative and *Candida* spp and has been commercialized combined with citrate and heparin to avoid occlusion. A study by Solomon et al.⁵ observed that the addition of 500 U/ml heparin and 4% citrate to taurolidine reduces the need for thrombolytic agents without increasing the bacteremia rate. Solomon LR et al.⁵ *Semin Dial* 2012.

OBJECTIVES

We aimed to evaluate the inflammatory profile of hemodialysis patients before and after locking catheters with an antimicrobial lock solution.

MATERIAL AND METHODS

- 31 patients in a stable hemodialysis program through tunneled cuffed catheters with standard 5% heparin lock during the previous 6 months (heparin phase) were enrolled in a study to prospectively evaluate the efficacy of Taurolidine-citrate-heparin lock solution (TCHLS; 13500 mg/L of taurolidine, 4% citrate and 500 UI of heparin) after each dialysis session for the following 6 months (TCHLS phase).

- High-sensitivity C-reactive protein (hsCRP), interleukin (IL)-6, IL-10, and tumor necrosis factor-alpha (TNF α) were measured in serum, and levels of mRNA gene expression of IL-6, IL-10 and TNF α were analyzed in peripheral blood mononuclear cells (PBMC). Samples were obtained at baseline and again after 3 months use of TCHLS.

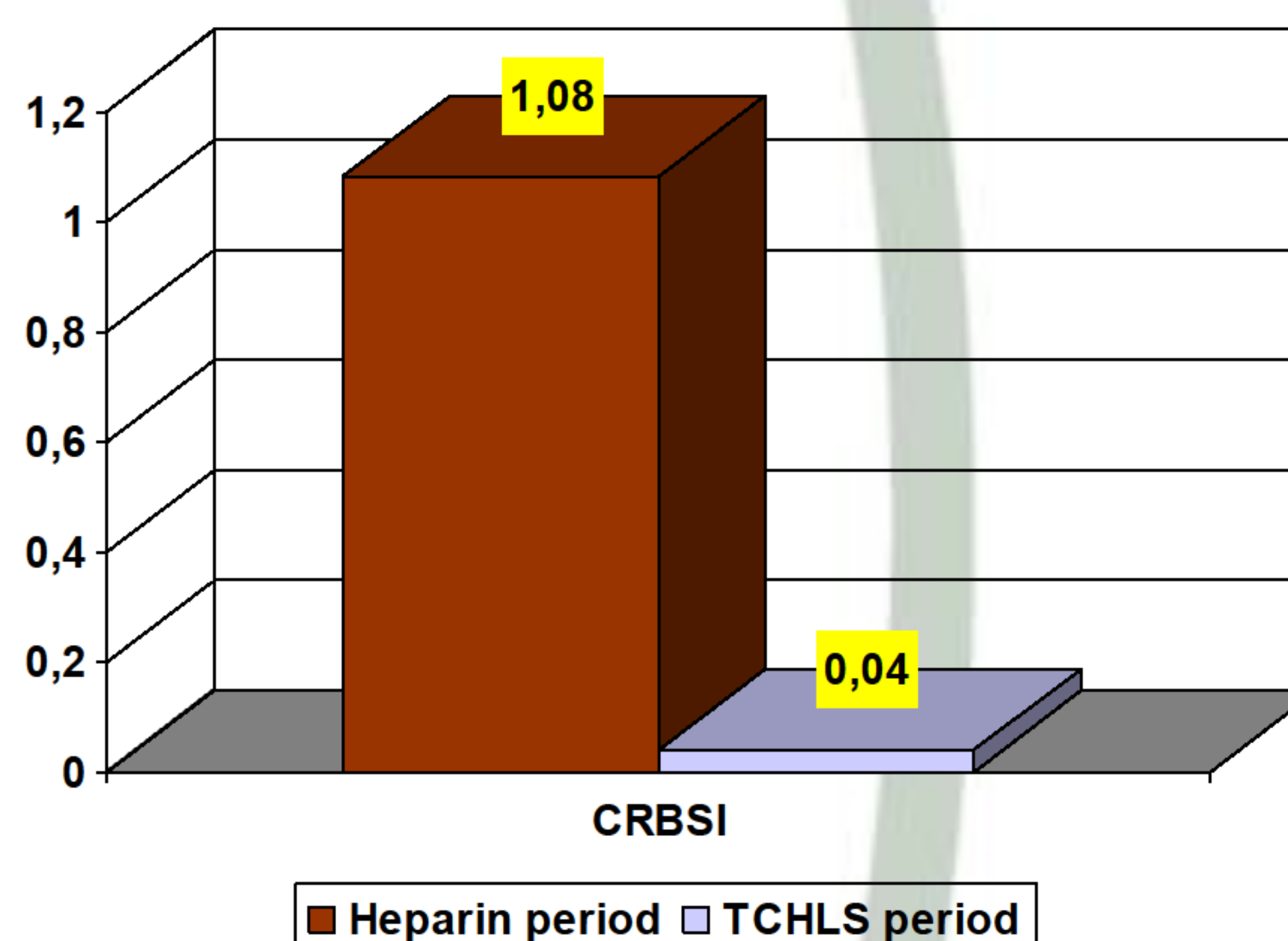
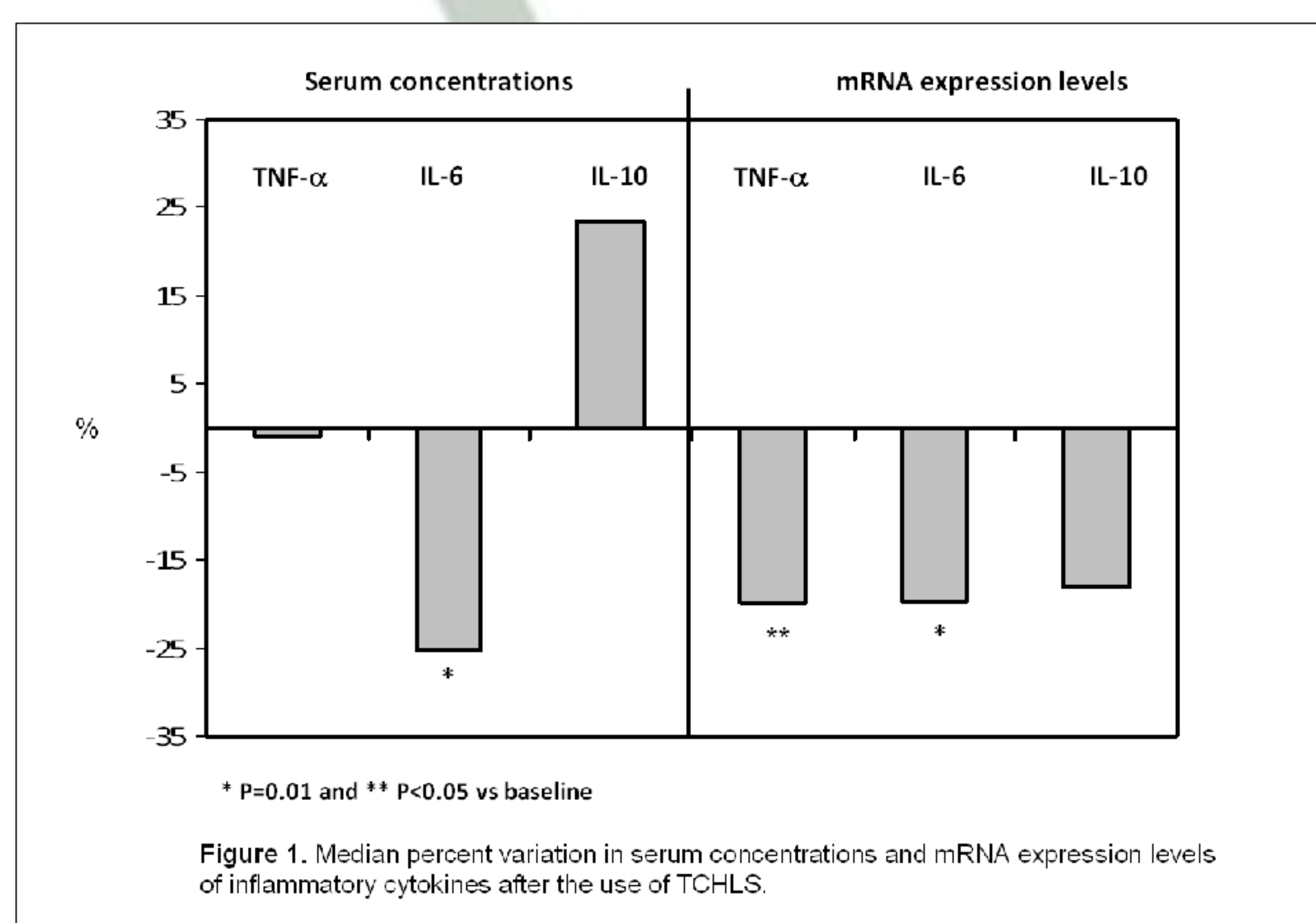
- Continuous variables were compared using Student's T test and categorical variables using χ^2 test or Fisher's exact test when necessary. A P-value < 0.05 was considered statistically significant.

RESULTS

Table 1. Changes in serum concentrations of inflammatory parameters and mRNA expression levels in peripheral blood mononuclear cells after the use of TCHLS.

Parameter	Baseline	3 months	P value
Serum concentration			
hs-CRP (mg/l)	1.0 (0.4-2.6)	0.8 (0.5-1.0)	0.015
IL 6 (pg/ml)	9.3 (5.3-14.8)	7.0 (3.9-10.6)	0.01
IL 10 (pg/ml)	0.8 (0.3-2.1)	1.0 (0.5-2)	0.23
TNF α (pg/ml)	3.1 (0.5-9.4)	3.1 (1.5-8.9)	0.37
*mRNA expression level			
TNF α	2.2 (1.4-3.0)	1.6 (1.4-2.1)	0.02
IL-6	2.5 (2.2-3.5)	1.9 (1.1-3.5)	0.01
IL-10	0.6 (0.4-1.5)	0.4 (0.2-1.1)	0.07

hs-CRP: high-Sensitivity C-reactive protein; IL: interleukin (IL) 6 and 10; TCHLS : Taurolidine-citrate-heparin lock solution; TNF α : tumor necrosis factor-alpha. Data are expressed as geometric mean and IQR.



Catheter-related bloodstream infections (CRBSI per 1000 catheter-days). *P = 0.023

(7 episodes Heparin period vs 1 episode TCHLS period): 3 SCN, 2 E. cloacae, 1 Klebsiella oxytoca, 1 Pseudomonas aeruginosa and 1 Streptococcus hemolyticus.

CONCLUSIONS

1.- In adult patients with end-stage renal disease under hemodialysis with cuffed tunneled catheters, the use of TCHLS after each hemodialysis session is associated with a significant improvement in the inflammatory serum and cytokine gene expression profile in PBMC, as well as a significant reduction in the rate of CRBSI.

2.- Future studies are required to confirm our results and to evaluate the long-term consequences of maintaining the catheter lumen sterile.

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