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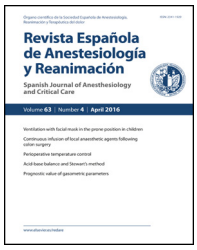

ORIGINAL ARTICLE

Axillary brachial plexus block duration with mepivacaine in patients with chronic renal failure. Case–control study☆

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KEYWORDS
Axillary block;
Chronic renal failure;
Mepivacaine;
Block duration

Abstract
Introduction: Regional anaesthesia is commonly preferred for arteriovenous fistula (AVF) creation. Previous studies suggest a shorter block duration in patients with chronic renal failure, maybe because of the changes in regional blood flow. The aim of our study was to evaluate the duration of the axillary block with 1.5% mepivacaine in patients with chronic renal failure scheduled for AVF compared with healthy controls.
Methods: Patients scheduled for AVF creation for the first time (GIRC) were included. They were compared with patients without renal failure (GC), with similar anthropometric characteristics. Ultrasound-guided axillary blocks with 20 ml of 1.5% mepivacaine were performed on all patients. We evaluated onset time, humeral artery diameter and blood flow before and after the block, as well as the block duration.
Results: Twenty-three patients (GIRC: 12 and GC: 11) were included. No differences between groups were observed in block duration (GIRC: 227 ± 43 min vs GC: 229 ± 27 min; $p = 0.781$), or in onset time (GIRC: 13 ± 5 min vs GC: 12.2 ± 3 min; $p = 0.477$). The humeral blood flow before and after block was significantly lower in the GIRC (pre-block: GIRC: 52 ± 21 ml/min and GC: 100 ± 62 ml/min; $p = 0.034$ and post-block: GIRC: 130 ± 57 ml/min and GC: 274 ± 182 ml/min; $p = 0.010$). There was no significant correlation between the duration of the block and the preblock humeral blood flow (Spearman rho: 0.106; $p = 0.657$) or the post-block humeral blood flow (Spearman rho: 0.267; $p = 0.254$).

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Conclusion: The duration of the axillary block with 1.5% mepivacaine in patients with chronic renal failure was similar to that of the control patients. The duration of axillary brachial plexus block seems not to be related to changes in regional blood flow.

PALABRAS CLAVE
Bloqueo axilar;
Falla renal crónica;
Mepivacaína;
Duración bloqueo axilar

Duración de bloqueo axilar con mepivacaína 1,5% en pacientes con insuficiencia renal crónica programados para fístula arteriovenosa. Estudio casos-controles

Resumen
Introducción: El bloqueo del plexo braquial para la creación de fístula arteriovenosa (FAV) ha demostrado buenos resultados, si bien algunos autores han evidenciado una duración del bloqueo inferior al de los individuos sanos, probablemente por cambios en el flujo arterial regional. Nuestro objetivo fue evaluar la duración del bloqueo axilar con mepivacaína al 1,5% en pacientes con insuficiencia renal crónica programados para FAV y compararlo con controles sanos.
Métodos: Se incluyó a pacientes con insuficiencia renal crónica en hemodiálisis, llevados por primera vez para la creación de una FAV (GIRC). Se compararon con pacientes sin insuficiencia renal (GC), con características antropométricas similares; todos bajo bloqueo axilar ecoguiado con 20 mL de mepivacaína al 1,5%. Se evaluaron el tiempo de latencia, el flujo y el diámetro de la arteria humeral pre y posbloqueo, así como la duración del bloqueo.
Resultados: Se incluyó a 23 pacientes (GIRC: 12 y GC: 11). No se observaron diferencias en la latencia (GIRC: 13 ± 5 min vs. GC: $12{,}2 \pm 3$ min, $p = 0{,}477$) ni en la duración del bloqueo (GIRC: 227 ± 43 min vs. GC: 229 ± 27 min, $p = 0{,}781$). El flujo pre y posbloqueo fue significativamente menor en el GIRC (prebloqueo: GIRC: 52 ± 21 ml/min, GC: 100 ± 62 ml/min, $p = 0{,}034$, y posbloqueo: GIRC: 130 ± 57 ml/min y GC: 274 ± 182 ml/min, $p = 0{,}010$). No existió una correlación significativa entre la duración y el flujo arterial de la extremidad prebloqueo (rho de Spearman: 0,106; $p = 0{,}657$) ni posbloqueo (rho de Spearman: 0,267; $p = 0{,}254$).
Conclusión: La duración del bloqueo axilar con mepivacaína al 1,5% en pacientes con insuficiencia renal crónica llevados por primera vez para creación de fístula arteriovenosa no es menor con respecto al grupo control y el flujo vascular como variable hemodinámica de la extremidad bloqueada no parece desempeñar un papel importante en la duración del mismo.

Introduction

Around 400,000 patients with chronic kidney disease are treated with haemodialysis in the United States,[1,2] and arteriovenous fistula continues to be the best vascular access for this treatment.[3,4] Evidence has shown better long-term fistula maturation and permeability and a lower incidence of placement failure when the procedure is performed under regional blockade,[5–10] due the sympathetic blockade associated with this technique. Among the many possible approaches,[9] the axillary approach is the most common in this group of patients.[11–15]

In 1972, Bromage and Gertel[16] reported a 38% decrease in the duration of supraclavicular brachial plexus block in renal patients compared to the general population. Subsequent studies, however, have questioned these findings. For example, Martin et al.[17] in 1988 found no significant differences in the duration of axillary brachial plexus block with lidocaine 1% and epinephrine in patients both with and without renal failure. This was echoed by McEllistrem et al.[18] in 1989 using interscalene block with lidocaine 1%, and by Rice et al.[19] in 1991, using supraclavicular block with bupivacaine 0.5%.

The pharmacokinetics of local anaesthetics may be altered by metabolic acidosis in patients with chronic renal failure, and this might affect the latency and duration of anaesthetic action; however, earlier studies found no correlation between shorter duration of action and severity of uraemia or acid–base imbalance.[16,20] Al-Mustafa et al.[20] found a correlation between sensory block latency and low bicarbonate levels. Bromage and Gertel attributed shortened duration of anaesthesia to increased cardiac output and blood flow leading to increased plasma clearance of local anaesthetic in the blocked limb. This is because the cardiac geometry of patients with renal failure is altered to compensate for the volume overload experienced in early stages of the disease, and patients with a glomerular filtration (GFR) rate of less than or equal to 30 ml/min/1.73 m^2 are twice as likely to present left ventricular hypertrophy than those with a GFR greater than 60 ml/min/1.73 m^2.