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Journal of the Medical Association of Thailand, Vol 96, No 3

[Home](#) > [Vol 96, No 3](#) > [Lapmahapaisan](#)

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Plasma Concentrations of Bupivacaine after Spinal Anesthesia with Single Shot Femoral Nerve Block in Total Knee Arthroplasty

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Abstract

Background: Femoral nerve block is commonly established for postoperative analgesia in total knee arthroplasty but no evidence of plasma bupivacaine level has been reported.

Objective: Determine the plasma concentrations of bupivacaine in patients who had single-injection of femoral nerve block.

Material and Method: A prospective observational study was undertaken with 25 patients scheduled for unilateral total knee arthroplasty under spinal anesthesia and single shot femoral nerve block with 20 mL of 0.5% bupivacaine. Venous blood samples were collected at 0, 5, 10, 15, 30, 60, 90, and 120 minutes after femoral nerve block. Plasma bupivacaine levels were analyzed by high performance liquid chromatography with tandem mass spectrometry.

Results: Four males and 21 females, ASA I-II were enrolled in the present study. Mean age, body mass index, and serum albumin level were 69.9±5.95 years, 27±3.67 kg/m², and 4.46±0.26 mg/dL, respectively. The median of peak plasma concentration was 538.35 ng/mL (min = 176.30, max = 1,383.99) at 60 minutes after femoral nerve block, while the maximal plasma concentration of bupivacaine was 1,883.39 ng/mL at 10 minutes. None showed signs or symptoms of bupivacaine toxicity.

Conclusion: Peak plasma concentrations of bupivacaine were demonstrated at 60 minutes after a single shot femoral nerve block, and no signs or symptoms of bupivacaine toxicity were observed. Therefore, single shot femoral nerve block with 20 mL of 0.5% bupivacaine is safe.

Keywords: Plasma bupivacaine level, Femoral nerve block

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