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SCIENTIFIC ARTICLE

Ultrasound guidance improves the success rate of axillary plexus block: a meta-analysis

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KEYWORDS
Meta-analysis;
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Abstract
Objective: To evaluate the value of real-time ultrasound (US) guidance for axillary brachial plexus block (AXB) through the success rate and the onset time.
Methods: The meta-analysis was carried out in the Anesthesiology Department of the Second Affiliated Hospital of Soochow University, Suzhou, Jiangsu Province, China. A literature search of Medline, EMBASE, Cochrane database from the years 2004 to 2014 was performed. The literature searches were carried out using medical subject headings and free-text word: ''axilla'', ''axillary'', ''brachial plexus'', ''ultrasonography'', ''ultrasound'', ''ultrasonics''. Two different reviewers carried out the search and evaluated studies independently.
Results: Seven randomized controlled trials, one cohort study and three retrospective studies were included. A total of 2042 patients were identified. 1157 patients underwent AXB using US guidance (US group) and the controlled group included 885 patients (246 patients using traditional approach (TRAD) and 639 patients using nerve stimulation (NS)). Our analysis showed that the success rate was higher in the US group compared to the controlled group (90.64% vs. 82.21%, $p < 0.00001$). The average time to perform the block and the onset of sensory time were shorter in the US group than the controlled group.
Conclusion: The present study demonstrated that the real-time ultrasound guidance for axillary brachial plexus block improves the success rate and reduce the mean time to onset of anesthesia and the time of block performance.

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PALAVRAS-CHAVE
Metanálise;
Bloqueio do plexo braquial;
Ultrassonografia

Orientação por ultrassom melhora a taxa de sucesso do bloqueio do plexo axilar: uma metanálise

Resumo
Objetivo: Avaliar o valor da orientação por ultrassonografia (US) em tempo real para bloqueio do plexo braquial por via axilar (BPBA) pela taxa de sucesso e tempo de latência.
Métodos: Uma metanálise foi realizada no Departamento de Anestesiologia do Segundo Hospital Afiliado da Universidade de Soochow, Suzhou, província de Jiangsu, China. Fizemos uma pesquisa bibliográfica nas bases de dados Medline, EMBASA e Cochrane de 2004 a 2014. A pesquisa foi realizada usando títulos de assuntos médicos e palavras de texto livre: *axilla*, *axillary*, *brachial plexus*, *ultrasonography*, *ultrasound*, *ultrasonics*. Dois revisores diferentes fizeram a pesquisa e avaliaram os estudos de forma independente.
Resultados: Sete estudos clínicos randômicos, um estudo de coorte e três estudos retrospectivos foram incluídos. Foi identificado um total de 2.042 pacientes, dos quais 1.157 foram submetidos ao BPBA guiado por ultrassom (grupo US); o grupo controle incluiu 885 pacientes, dos quais 246 foram submetidos à abordagem tradicional (TRAD) e 639 à estimulação do nervo (EN). Nossa análise mostrou que a taxa de sucesso foi maior no grupo US em comparação com o grupo controle (90,64% *vs.* 82,21%, $p < 0,00001$). As médias do tempo necessário para realizar o bloqueio e do tempo de latência foram mais curtas no grupo US que no grupo controle.
Conclusão: O presente estudo demonstrou que a orientação por ultrassom em tempo real para o bloqueio do plexo braquial por via axilar melhora a taxa de sucesso e reduz a média do tempo de início da anestesia e do tempo de execução do bloqueio.

Introduction

In recent years, the people paid more and more attentions on the local anesthesia, especially on peripheral nerve block technique.[1,2] The traditional nerve block needs the help of anatomical landmarks, the arterial pulse, needling of abnormal sensation or nerve stimulator, but, with the rapid development of technology of ultrasound device, under the guidance of ultrasound nerve block anesthesia as a new field of an ultrasonic applications are gradually being retired by the attention, ultrasonic technology is a fundamental change in the way nerve block. Brachial plexus block are the most common methods used in peripheral nerve block. Peripheral nerve stimulation may have a high degree of accuracy and reliability for the axillary nerve block, but sometimes cause failure or incomplete block, even when took multiple stimulation and injection.[3,4]

Anesthesiologists have been able to observe the brachial plexus and the surrounding structures through the ultrasound guided puncture.[5] So anesthesiologists can puncture into the target peripheral nerve accurately with real-time ultrasound. The injection process and the diffusion range of local anesthetics can also be observed by ultrasonography. The technology ensured the local anesthetic evenly spread to peripheral nerve, make local anesthetics fully infiltrate the nerve, significantly improve the success rate and reduce the complications.

Methods

Search strategy

The meta-analysis was carried out in the Anesthesiology Department of the Second Affiliated Hospital of Soochow University, Suzhou, Jiangsu Province, China. A literature search of Medline, EMBASE, Cochrane database from the years 2004 to 2014 was performed. The literature searches were carried out using medical subject headings and free-text word: ''axilla'', ''axillary'', ''brachial plexus'', ''ultrasonography'', ''ultrasound'', ''ultrasonics''. Two different reviewers carried out the search and evaluated studies independently.

Inclusion criterion

All randomized, non-randomized controlled clinical trials, which compared ultrasound-guided AXB with traditional approach or peripheral nerve stimulation included.

Exclusion criterion

Abstracts, letters, case reports, comments, and conference proceedings were not included in the review. We exclude studies with small-sized group (<40 patients).

Date collection

Two reviewers independently extracted the following from each study: first author, publication data, study design, inclusion criteria and exclusion criteria. All disagreements were resolved through discussion. Non-comparative studies, cases series, and case report were not included.