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Special Article

Consensus of the Orthopedic Anesthesia, Pain, and Rehabilitation Society on the use of peripheral nerve blocks in patients receiving thromboprophylaxis

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Abstract Evidence supports the concept that patients undergoing major orthopedic surgery benefit from either thromboprophylaxis or peripheral nerve blocks, especially continuous techniques. A group of anesthesiologists with significant experience in orthopedic anesthesia and peripheral nerve blocks reviewed the literature related to thromboprophylaxis and peripheral nerve blocks and their combination in orthopedics. Major bleeding, including retroperitoneal hematoma, is an established complication of thromboprophylaxis. Major bleeding, including retroperitoneal hematoma, is also an established complication of peripheral nerve blocks. Between 1997 and 2012, only 4 case reports of major bleeding were reported in patients receiving thromboprophylaxis and peripheral nerve blocks. Evidence supports the safety of the combination of thromboprophylaxis and peripheral nerve blocks. This group of experts

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concluded that currently there is no evidence that the combination of thromboprophylaxis and peripheral nerve block increases the risk of major bleeding compared to either of the treatments alone.

1. Introduction

The third version of recommendations on "Regional Anesthesia in the Patient Receiving Antithrombotic or Thrombolytic Therapy" from the American Society of Regional Anesthesia (ASRA) indicates that caution should be exercised when combining plexus and deep blocks with antithrombotic and thrombolytic therapy because of the potential associated increased risk of major bleeding and retroperitoneal hematoma [1].

Since randomized clinical trials [2–5] and meta-analyses [6–9] have demonstrated the benefits of peripheral nerve blocks and since thromboprophylaxis is the most frequent indication for anticoagulants in patients receiving joint replacement, the relevant literature was reviewed to determine the risk of major bleeding with the combination of thromboprophylaxis and nerve blocks with a special focus on patients undergoing total joint replacement. The level of evidence provided by each article was classified using an approach similar to that used by the Society of Chest Physicians [10]. The findings were presented at a plenary session of the Orthopedic Anesthesia, Pain, and Rehabilitation Society (OAPRS) annual meeting on October 14, 2011. This article presents the OAPRS consensus.

I. Risk of major bleeding, including retroperitoneal hematoma, associated with the performance of peripheral nerve blocks

Performing superficial and deep peripheral nerve blocks may lead to vascular injury and major bleeding, including retroperitoneal hematoma (level of evidence 1C). Major bleeding, including retroperitoneal hematoma, has been reported following the performance of both superficial (stellate ganglion [11] axillary [12,13], infraclavicular [14], interscalene [15], and ilioinguinal/iliohypogastric blocks [16,17]), and deep and plexus blocks (paravertebral [18], lumbar sympathetic [19], and pudendal) [20] (level of evidence 1C).

II. Risk of major bleeding, including retroperitoneal hematoma, associated with thromboprophylaxis

Major bleeding (defined as fatal bleeding, bleeding that occurred into a critical organ, bleeding that required reoperation, clinically overt extrasurgical-site bleeding associated with a decrease in hemoglobin of ≥ 2 g/dL or requiring transfusion of ≥ two units of whole blood or packed red blood cells) have been reported as a complication of both thrombolysis and thromboprophylaxis [21]. The risk of major bleeding, including retroperitoneal hematoma, is dependent on the dosage administered, which increases the risk for major bleeding either directly (overdosage) or indirectly related to a drug interaction [22] or a reduced ability to metabolize and eliminate drugs [23,24], which explains the documented increased risk of anticoagulants inducing major bleeding in cachectic patients, patients with liver and/or renal insufficiency, and elderly [23–26] patients. The dose and modality of administration of anticoagulants administered for both thromboprophylaxis and therapeutic indications, including thrombolytic therapy, are presented in Table 1.

The relative risk of major bleeding is considered to be low with warfarin (level of evidence 1C) [27,28], and higher with heparin [29–32] and low molecular weight heparins (LMWHs) such as enoxaparin [33–40] and fondaparinux [41,42] when anticoagulant is used for therapeutic indications (level of evidence 1A). The most recent drugs of this class, rivaroxaban and dabigatran [43,44], are no exceptions.

Although the dose used for thromboprophylaxis is one half or one third the dose required for thrombolytic therapy, major bleeding, including retroperitoneal hematoma, also has been reported following the administration of thromboprophylaxis using LMWHs such as enoxaparin [45–47] or fondaparinux [48], and even with the most recent drugs of this class, dabigatran and rivaroxaban (level of evidence 1A) [49–53].

III. Risk of major bleeding, including retroperitoneal hematoma, associated with the combination of peripheral nerve blocks and thromboprophylaxis

The risk of major bleeding, including retroperitoneal hematoma, from the combination of anticoagulant and peripheral nerve block appears to increase when anticoagulants rather than thromboprophylaxis are indicated for

Table 1 Type of anticoagulant and dosing for thromboprophylaxis and thrombolytic indications

	Thromboprophylaxis	Thrombolytic therapy
Aspirin	325 mg BID	
Enoxaparin	30 mg BID or 40 mg qd	greater than 30 mg BID or 40 mg qd
Fondaparinux	2.5 mg qd	7.5 mg qd
Fragmin	5000 U qd	greater than 5000 U qd
Heparin SC	5000 U BID or TID	heparin infusion
Rivaroxaban	10 mg qd	20 mg qd
Dibagatran		150 mg BID

BID = twice daily, qd = four times daily, SC = subcutaneous, TID = three times daily.