

Regional vs general anesthesia for peripheral vascular surgery

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Anesthesiologists have debated for many years whether regional anesthesia is better than general anesthesia for patients undergoing peripheral vascular surgery. Many studies that demonstrated significant advantages of regional anesthesia over general anesthesia for the patient population in question often had uneven distribution of sick patients between the groups, small sample size, an unclear description and, sometimes, inadequate anesthetic management⁽¹⁾. Thus, many studies in this area are weak in experimental design and therefore, have not produced definite answers. However, there are some relatively clear and convincing data confirming certain advantages of regional anesthesia for this patient population⁽²⁻⁵⁾. One of them is a better pulmonary function and overall pulmonary outcome after regional anesthesia than after general anesthesia during the post-operative period^(6,7).

One of the most interesting and controversial issues is the cardiovascular function and incidence of myocardial ischemia and myocardial infarction during the intra- and post-operative period in these patients⁽²⁾. The claim that epidural or spinal anesthesia-induced decreases in afterload and preload in these patients are beneficial to these patients deserves some comment. Not all patients, even patients with cardiac diseases, need their preload or afterload decreased. If it is needed, there are drugs in our possession that can decrease preload or afterload when desired, to an exactly planned extent and for an exact period of time, while the effects of epidural and spinal anesthesia on these two variables — preload and afterload — might be more or less than desired and might last for a longer time than needed. In addition, it is important to realize that a decrease in preload and afterload very often requires additional therapy with vasoconstrictors and/or additional fluid load. Some studies demonstrated that regional anesthesia is associated with an increase of up to three litres in fluid load during surgery,

compared with general anesthesia^(8,9). An observed improvement in coronary circulation and a decrease in myocardial infarction size⁽¹⁰⁾ can be easily explained by a decrease in myocardial oxygen demand (which probably can be achieved by a combination of vasodilators and α_1 -adrenergic antagonists) rather than as a result of the “magical” effects of regional anesthesia. A few studies demonstrated an improvement in cardiac outcome, including myocardial ischemia, myocardial infarction, cardiac death^(4,11-13). On the other hand, the majority of studies could not demonstrate a clear advantageous effect of regional anesthesia on cardiac outcome⁽²⁾ while some trials demonstrated even an increase in myocardial ischemia after epidural analgesia was discontinued⁽¹⁴⁾. Meta analysis of the studies in this area suggest certain improvements in cardiac outcome with the use of regional anesthesia⁽²⁾.

A few studies (but not all) demonstrated a clear improvement in function of the gastrointestinal tract during post-operative period⁽¹⁵⁾. Analysis of the literature⁽¹⁶⁾ strongly suggests that the beneficial effect of epidural anesthesia and analgesia in this regard is observed only when thoracic epidural anesthesia is performed. When lumbar epidural anesthesia and analgesia are performed, the effect on gastrointestinal function was relatively minimal if any⁽¹⁶⁾. Therefore, since regional anesthesia for infra-inguinal vascular surgery is performed at the lumbar level, it would not provide a clear advantage in this regard.

The most interesting controversy in the saga of regional vs general anesthesia for peripheral vascular surgery is a decrease in stress response produced by regional anesthesia. The problem is that we really do not know yet whether a decrease in overall stress response is necessarily beneficial. Some studies suggest that stress response is needed to survive the stress⁽¹⁷⁾. Others demonstrated that stress response is not significantly modified by regional anesthesia⁽¹⁸⁾. On

the other hand, there is clear evidence that some components of stress response are detrimental to cardiovascular function. Hypertension and particularly tachycardia, resulting from an increase in the release of catecholamines, are certainly detrimental for a patient with coronary artery disease. Studies demonstrated that the pre-operative Plasminogen Activator Inhibitor-1 (PAI-I) concentrations and the type of anesthesia predict post-operative arterial thrombosis: and increase the PAI-I concentrations is associated with higher incidence of thrombosis. Regional anesthesia might prevent such an increase^(19,20). It has been demonstrated that surgical stress is associated with an increase in the concentrations of different factors in coagulation cascade and inhibition of fibrinolysis. Evidence suggests that the hypercoagulable state and inhibition of fibrinolysis are associated closely with many components of stress response to surgical trauma. Therefore, since an increase in PAI-I concentration is modified by regional anesthesia⁽²⁰⁾, it may have a beneficial effect. During the last couple of decades a significant increase in the use of anticoagulants and inhibitors of platelet function in this patient population has been observed. The relevant question is what is better for prevention of thrombotic complications of vascular surgery, regional anesthesia or specific drugs affecting coagulation processes? There are no definitive studies addressing this question. This observer believes that a specific therapy in this regard is more effective than regional anesthesia.

The risk of development of epidural hematoma in patients undergoing temporary and partial heparinization during surgery is minimal but real^(21,22). Obviously, the therapy

with strong anticoagulants and inhibitors of platelet function is contra-indicated the use of regional anesthesia.

It is important to realize that regional anesthesia per se might be harmful to our patients if provided incorrectly. Some observers reported the detrimental effect of epidural anesthesia on overall cardiovascular function. For example, some studies showed a decrease in cardiac output and total body oxygen delivery with an increase in oxygen extraction and tissue hypoxia⁽²³⁾.

SUMMARIZING

1. The majority of patients tolerate any anesthesia well.
2. The majority of beneficial physiologic effects of regional anesthesia can be achieved by specific drugs.
3. Many patients may benefit from regional anesthesia, e.g., by a decrease in thromboembolism (degree has not yet been determined). Probably the effects of specific therapy in this regard is more effective than regional anesthesia.
4. Regional anesthesia most probably improves post-operative pulmonary function and decreases the rate of post-operative pulmonary complications.
5. Risk of epidural hematoma following heparin therapy is extremely low but real.
6. Very sick patients might benefit from "general" anesthesia because it represents intensive care and consists of controlled ventilation and carefully titrated appropriate pharmacologic interventions, including use of small doses of general anesthetics.

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