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THE USE OF ANAESTHETIC METHODS IN ATHLETES' ORTHOPEDIC SURGERY: A LITERATURE REVIEW OF THE IMPACT ON REHABILITATION AND QUALITY OF CARE

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ABSTRACT

Background: Athletes aim for rapid, pain-free return to activity after injury, but many of them require surgery. As the choice of anesthesia for surgery affects postoperative recovery and patient satisfaction it is crucial to analyze which type of anesthesia is adequate.
Aim: This literature review was created to analyze the latest information on general versus regional anaesthesia on postoperative rehabilitation, pain management, length of hospital stay, and perceived quality of care in the context of orthopedic procedures in physically active patients.
Materials and methods: The review analyzed current literature from Pubmed and other medical databases published between 2000 and 2025.
Conclusion: A large number of factors must be taken into account when choosing what type of anaesthesia must be used. Patient collaboration, a holistic approach to the patient and understanding his needs influences the rehabilitation process and thus a faster return to health and physical activity.

KEYWORDS

Anaesthesia, Orthopedic Surgery, Athletes, Regional Anaesthesia, Spinal Anaesthesia, Postoperative Rehabilitation, Quality Of Care, Pain Management

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Introduction

Both professional and amateur athletes often suffer from bone and joint injuries. In a study conducted in 2019 over 40% of the participants had an injury in 2019 [1]. The most common injuries in professional sportsmen are muscle and tendon strains and ligament sprains [2] and in amateurs tendonitis, knee overload pain and injuries to tendons and muscles (especially the biceps femoris) [3]. Many of these need to be operated - like anterior cruciate ligament reconstruction [4] or femoroacetabular impingement [5]. As anaesthesia is a part of the operation [6], the strategy used is not only important for the patient's safety during the procedure, but also impacts how the patient is recovering after. For physically active patients, quick recovery is important, but so is getting back into shape without pain [7]. According to recent studies, the appropriate method of anesthesia decreases the amount of opioids administered postoperatively [8, 9] and shortens the time of hospital stay [10, 11].

The aim of the study is to review the current state of knowledge about the influence of different methods of anaesthesia on recovery after orthopedic surgery and to assess the quality of perioperative care in athletes. The literature review will identify the most commonly used anaesthetic strategies and their clinical and functional consequences for physically active patients.

Research materials and methods

This review aims to collect, analyze and present the current literature on anaesthesia methods used in orthopedic surgery in athletes and their impact on rehabilitation and the quality of medical care.

The review included:

- publications in English and Polish,
- original studies (both randomized and observational), systematic reviews and meta-analyses,
- articles published between 2000 and 2025,
- works on athletes (both professional and amateur) undergoing orthopedic surgery using general or regional anesthesia,
- studies assessing the effect of the type of anesthesia on the course of rehabilitation, pain level, return to physical activity or quality of care.

The review excluded:
- case reports,
- editorial comments and letters to the editor,
- articles not available in full text,
- works on physically inactive patients or those with chronic conditions unrelated to sports injuries.

Literature was searched in the following databases:
- PubMed,
- Scopus,
- Web of Science,
- Google Scholar.

Keywords (and their combinations) used in the search:
anesthesia, general anesthesia, regional anesthesia, spinal anesthesia, nerve block, sports surgery, orthopedic surgery, athletes, rehabilitation, postoperative pain, recovery, quality of care, pain management, return to play.

After removing duplicates, titles and abstracts were reviewed for their relevance to the subject matter of the study. Full texts of selected articles were then subjected to content analysis. The study results were grouped thematically according to the method of anaesthesia and the assessed clinical and functional effects.

Methods of anesthesia in orthopedic surgery treatment

In orthopedic surgery two types of anesthesia are commonly used - general anesthesia, and regional anesthesia (most often in the form of nerve blocks and spinał anesthesia). The method that will be used depends on several factors - the location of the operated area, the preferences of the patient and medical team, the duration of the procedure, and expectations regarding the speed of return to physical activity.

General anesthesia

General anaesthesia is used in situations when the operating field is wide or when the patient did not consent to spinal anesthesia or nerve block. Inhalation and intravenous anesthetics, opioid drugs and muscle relaxants are used for general anesthesia [12].

Although general anesthesia provides full control over the course of anesthesia [13], it is associated with a longer recovery time [8, 14, 15] and a greater risk of nausea, vomiting and postoperative weakness [15, 16]. This may result in an increased supply of opioid drugs in the postoperative period, which affects the course of rehabilitation [8, 9, 17, 18].

Regional anesthesia

Regional anesthesia involves techniques that block nerve conduction in a specific area of the body. In orthopedic surgery, the most common methods used are:
- Femoral nerve block – for knee surgery (e.g. reconstruction of the anterior cruciate ligament),
- Brachial plexus block – for shoulder and upper limb surgery,
- Lower limb peripheral nerve block – for ankle or foot surgery.

Another method of regional anesthesia is spinal anesthesia [19]. It consists of a single administration of an anesthetic directly into the subarachnoid space, most often in the lumbar region (L3–L4 or L4–L5) [20]. As a result, there is a rapid and complete blocking of sensory and motor conduction in the lower half of the body [20]. It used for operations of:
- knee (e.g. cruciate ligament reconstruction, meniscectomy),
- hip joint (e.g. endoprosthetics in amateur athletes),
- lower limb below the knee (e.g. foot and ankle surgery).

Regional anaesthesia allows to maintain more effective pain relief in the first hours and days after the procedure [19, 21, 22, 23], less opioid use [19, 21, 23, 24, 25, 26], faster patient mobilization [27, 28, 29], shorter hospitalization time [27, 30, 31], often better overall well-being after the procedure [19] than general anesthesia.

The impact of anesthesia on the rehabilitation of athletes

The appropriate choice of anesthesia for these patients affects the rehabilitation time, as well as the speed of recovery, the level of postoperative pain, and the need for opioid drugs. For physically active patients, effective and quick recovery is important because especially for professional athletes it can affect their professional career.

Postoperative pain and analgesia

One of the most important factors affecting how rehabilitation is effective is controlling the level of postoperative pain. As Ilfeld's article highlighted, regional anaesthesia allows for better control of pain in the first 24-72 hours after the operation [24].

As an example, femoral nerve block after ACL reconstruction reduces pain intensity [25]. Thanks to this less opioids are used, which results in a reduced supply of these drugs and therefore fewer side effects associated with the use of these drugs, such as vomiting or dizziness [26].

Early mobilization and hospitalization time

When combining regional analgesia techniques with an appropriate pain management plan the patient can begin rehabilitation treatment more quickly [27, 28, 29]. Studies emphasize that with this type of anesthesia, patients are discharged home more quickly [27, 30, 31], which also improves their well-being [19, 32].

Impact on muscle function and risk of falls

One of the side effects of regional anesthesia, such as femoral nerve block, may be a temporary weakening of the muscle strength of the lower limb [33, 34]. This may result in difficulties in taking the first steps after surgery and increases the risk of falls [33, 35]. The way to avoid this problem is using for example medial canal blockade, which provides analgesia without significantly affecting muscle strength [36, 37].

Time to return to sports activity

It is difficult to clearly assess the impact of anesthesia on the long-term return to sport, although better post-operative pain control and faster rehabilitation means the patient can return to training faster [38, 39].

Quality of Perioperative Care in Sports Surgery

Nowadays not only the medical procedure is important, but also the quality of perioperative care. The role of anesthesiologist is important because it influences the patient's experience, the effectiveness of rehabilitation and the overall assessment of the treatment process. The patient pays attention to how effectively he is treated for pain, whether he has access to information and also whether he is taken care of.

The role of the anaesthesiologist in the medical team

The anesthesiologist not only administers anesthesia, but also influences the assessment of perioperative risk, selection of the safest and most effective method of anesthesia, monitoring the patient's condition during the procedure and in the postoperative period, and planning pain relief after surgery [40].

Patient satisfaction and comfort

As the recent study showed, athletes expect a quick return to activity, minimal pain and an individual approach to treatment [41]. Comparing general anesthesia with regional anesthesia, after regional anesthesia, there are fewer postoperative complaints and patients recover faster [41]. Although there are many concerns associated with regional anesthesia like nerve damage or anesthetic toxicity [42, 43]. That is why communication with the patient is important because good communication reduces anxiety and improves patient engagement in the treatment process [44]. Injured sportsmen who received appropriate care cooperate more willingly with medical professionals and follow post-operative recommendations better [45, 46]. That is why every patient needs an individual approach. Aspects that should be taken into account when choosing the right anaesthesia include: the nature of the injury and the type of procedure, the expected time of return to sports, the patient's previous experience with anaesthesia, psychological factors like the pressure of competitions.

Discussion

The analysis of available literature indicates that the choice of anesthesia method in orthopedic surgery of athletes has a significant impact on the course of rehabilitation and the assessment of the quality of medical care. Comparing regional anesthesia to general anesthesia, in regional anesthesia there is a greater effective control of pain - less opioids are administered [19, 21, 23, 24, 25, 26], shortening the hospitalization time [27, 30, 31] and enabling earlier mobilization [27, 28, 29]. However, regional techniques may be associated with a temporary weakening of muscle strength which may result in falls [34, 35].

It is worth emphasizing that the long-term return to sports activity after anesthesia is still poorly understood. Aspects that need to be studied more are individual needs of athletes, the diversity of disciplines and the specificity of injuries. It could optimize anaesthesia methods and rehabilitation plans.

What else influences the patient's recovery process is also an interdisciplinary and holistic approach to him, taking into account the physical, but also the psychological aspects. Education [47] and communication in the patient-doctor relationship can reduce anxiety and increase involvement in the recovery process [48, 49].

Conclusions

- Regional anesthesia in injured athletes provides better pain control, reduces rehabilitation time, and is associated with higher patient satisfaction than general anesthesia.
- The choice of anesthesia method should be individually adjusted to the type of procedure, the specific nature of the injury and the needs and expectations of the athlete.
- Monitoring for potential side effects, such as muscle weakness, is essential for safe and effective rehabilitation.
- Holistic perioperative care, based on interdisciplinary cooperation and good communication with the patient, improves the quality of care and influences a faster return to sports activity.
- Further research is needed on the impact of different anaesthetic techniques on long-term functional outcomes and quality of life of athletes after orthopedic surgery.

Disclosure

Author's contributions:

Conceptualization: Marianna Latour, Ryszard Łagowski
Methodology: Karolina Kananowicz, Zofia Laska
Software: Ryszard Łagowski, Honorata Juniewicz, Patryk Heryć
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Formal analysis: Karolina Kananowicz, Jakub Piotrowski
Investigation: Zuzanna Kudlińska, Honorata Juniewicz, Zofia Laska
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Writing-rough preparation: Zuzanna Kudlińska, Anna Jędrasiak
Writing-review and editing: Marianna Latour, Anna Jędrasiak
Visualization: Zofia Laska, Marianna Latour, Patryk Heryć
Supervision: Zuzanna Kudlińska, Karolina Kananowicz, Honorata Juniewicz
Project administration: Jakub Piotrowski, Julia Kosęda

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In preparing this work, the authors used ChatGPT for the purpose of improving language and readability. After using this tool, the authors have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

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