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ЮРАК ЕТИШМОВЧИЛИГИ БЎЛГАН БЕМОРЛАРДА СПИНАЛ АНЕСТЕЗИЯНИНГ ХАВФСИЗЛИГИ

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БЕЗОПАСНОСТЬ СПИНАЛЬНОЙ АНЕСТЕЗИИ У ПАЦИЕНТОВ С СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТЬЮ

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Резюме. Тадқиқот мақсади: Ушбу адабиёт шарҳи юрак етишмовчилиги бўлган беморларда спинал анестезиянинг хавфсизлигини баҳолашга қаратилган бўлиб, унинг физиологик таъсирлари, хавфсизлик самарадорлиги ва хавфларни камайтириш стратегияларига қаратилган. Усуллар: PubMed, Scopus ва Google Scholar маълумотлар базаларидан фойдаланиб кенг қамровли адабиёт қидируви амалга оширилди. Калит сўзлар сифатида “спинал анестезия”, “юрак етишмовчилиги”, “хавфсизлик” ва “гемодинамик таъсирлар” ишлатилди. Сўнгги 10 йил ичида чоп этилган ва юрак етишмовчилиги бўлган катталарда спинал анестезиянинг хавфсизлиги, самарадорлиги ва асоратлари ёритилган тадқиқотлар танлаб олинди. Кузатув тадқиқотлари, клиник синовлар, мета-таҳлиллар ва клиник ҳолатлар таҳлил қилинди. Натижалар: Спинал анестезия компенсацияланган юрак етишмовчилиги бўлган беморлар учун сезиларли афзалликларга эга эканлиги аниқланди, жумладан миокарднинг кислородга бўлган эҳтиёжининг камайиши ва периферик томирлар қаршилигини камайтириш орқали юракнинг зарб ҳажмининг ошиши. Клиник тадқиқотлар спинал анестезиянинг барқарор юрак етишмовчилиги (NYHA I–II) фонида беморлар учун кучайтирилган мониторинг шароитида хавфсиз усул эканлигини кўрсатди. Бироқ, гипотензия, юрак етишмовчилигининг декомпенсацияси ва перфузиянинг ёмонлашиши каби хавфлар, айниқса оғир ёки декомпенсацияланган юрак етишмовчилиги (NYHA III–IV) бўлган беморларда сезиларли даражада сақланиб қолганлиги аниқланди. Баъзи тадқиқотларда спинал анестезия умумий анестезияга нисбатан камроқ периоперацион асоратлар, жумладан аритмия ва ўпка шиши билан боғлиқ бўлган асоратлар билан кечиши аниқланди. Операциядан олдин оптимал тайёргарлик, кучайтирилган мониторинг ва вазопрессорларни оқилона қўллаш натижаларни яхшилашда муҳим рол ўйнайди. Хулоса: Спинал анестезия барқарор юрак етишмовчилиги бўлган беморлар учун индивидуал ёндашув шароитида мақбул анестезия танлови ҳисобланади. Бироқ, унинг оғир ёки декомпенсацияланган юрак етишмовчилиги бўлган беморларда қўлланиши хавфларни синчковлик билан баҳолаш ва кучайтирилган интраоперацион мониторингга талаб қилади. Катта қўламли рандомизацияланган назоратли синовлар ва кичик гуруҳлар таҳлилини ўз ичига олган қўшимча тадқиқотлар стандартлаштирилган кўрсатмалар ишлаб чиқиш ва альтернатив усулларни ўрганиш учун зарур ҳисобланади.

Калит сўзлар: спинал анестезия, юрак етишмовчилиги, гемодинамик таъсирлар, маҳалий анестезия, периоперацион хавфсизлик, юрак дисфункцияси.

Abstract. Objective: This literature review aims to evaluate the safety of spinal anesthesia in patients with heart failure, focusing on its physiological effects, evidence of safety, and strategies for risk mitigation. Methods: A comprehensive literature search was conducted using databases such as PubMed, Scopus, and Google Scholar. Keywords included "spinal anesthesia," "heart failure," "safety," and "hemodynamic effects." Studies published within the last 10 years that addressed the safety, benefits, and risks of spinal anesthesia in adult patients with heart failure were included. Observational studies, clinical trials, meta-analyses, and case reports were analyzed. Results: Spinal anesthesia can offer significant advantages in stable heart failure patients, such as reduced myocardial oxygen demand and improved cardiac output by decreasing afterload. Clinical studies show a generally favorable safety profile in stable (NYHA Class I–II) heart failure patients when used with appropriate monitoring. However, risks such as hypotension, cardiac decompensation, and poor perfusion remain significant, particularly in patients with severe or decompensated heart failure (NYHA Class III–IV). Spinal anesthesia was also associated with fewer perioperative complications compared to general anesthesia in some studies, including lower rates of arrhythmias and pulmonary edema. Tailored approaches involving preoperative

optimization, vigilant monitoring, and judicious use of vasopressors were key to improving outcomes. Conclusion: Spinal anesthesia is a viable option for patients with stable heart failure when applied with caution and individualized care. However, its use in severe or decompensated heart failure requires careful risk assessment and enhanced intraoperative management. Further research, including large-scale randomized controlled trials and subgroup analyses, is needed to establish standardized guidelines and explore alternative techniques.

Keywords: *spinal anesthesia, heart failure, hemodynamic effects, regional anesthesia, perioperative safety, cardiac dysfunction.*

Introduction. Spinal anesthesia is a widely utilized regional anesthetic technique, particularly favored for lower abdominal, pelvic, and lower extremity surgeries. By delivering local anesthetics into the cerebrospinal fluid within the subarachnoid space, spinal anesthesia induces sensory and motor blockade while offering distinct hemodynamic effects. Its ability to provide profound analgesia with minimal systemic drug exposure makes it an attractive choice, especially in patients where general anesthesia poses higher risks [5].

Heart failure, a clinical condition characterized by the heart's inability to pump blood effectively, presents significant challenges in perioperative management. These patients are often hemodynamically fragile, with altered preload, afterload, and myocardial reserve, making them vulnerable to the physiological changes induced by anesthesia. The selection of an anesthetic technique in this population is critical to avoid exacerbating cardiac dysfunction and ensuring optimal perioperative outcomes [7].

This literature review aims to evaluate the safety profile of spinal anesthesia in patients with heart failure. Specifically, it explores the physiological effects of spinal anesthesia on the cardiovascular system, examines evidence from clinical studies regarding its benefits and risks in heart failure patients, and discusses strategies to enhance its safety in this vulnerable population. By synthesizing current evidence, this review seeks to provide a comprehensive understanding of whether spinal anesthesia is a viable and safe option for patients with heart failure [1].

Spinal Anesthesia and Its Mechanism of Action. Spinal anesthesia is a regional anesthetic technique that involves the injection of a local anesthetic agent into the subarachnoid space, typically at the lumbar level of the spine. This process results in temporary blockade of sensory, motor, and autonomic nerve transmission. The local anesthetic works by inhibiting sodium ion channels within the neuronal axons, preventing the propagation of action potentials. As a result, patients experience a loss of sensation and motor function in the areas innervated by the affected spinal nerve roots [2].

A key feature of spinal anesthesia is its rapid onset and predictable effects, which make it a reliable choice for a variety of surgical procedures. However, it also causes a sympathetic nervous system blockade, leading to vasodilation, reduced systemic vascular resistance, and a subsequent decrease in preload and afterload. While these effects are generally well-tolerated in healthy individuals, they may have significant implications for patients with compromised cardiovascular function, such as those with heart failure [7-10].

Heart Failure and Its Physiological Challenges. Heart failure is a complex clinical syndrome that arises when the heart is unable to pump blood efficiently to meet the body's metabolic demands. This condition can result from structural or functional abnormalities of the heart, such as reduced contractility, impaired ventricular filling,

or valvular dysfunction. Heart failure is often categorized into two main types: heart failure with reduced ejection fraction (HFrEF) and heart failure with preserved ejection fraction (HFpEF). Both types present distinct pathophysiological features but share common challenges that complicate perioperative management [3].

In heart failure, the cardiovascular system is typically in a state of chronic compensation to maintain cardiac output. Mechanisms such as increased sympathetic activation, elevated circulating catecholamines, and heightened reliance on preload can make these patients highly sensitive to changes in blood pressure and fluid status. The sympathetic blockade induced by spinal anesthesia can lead to a sudden reduction in systemic vascular resistance and preload, which may compromise cardiac output and exacerbate symptoms of heart failure. Additionally, the reduced myocardial reserve in heart failure patients limits their ability to tolerate abrupt hemodynamic shifts, increasing the risk of perioperative complications [9].

Interaction Between Spinal Anesthesia and Heart Failure. The hemodynamic effects of spinal anesthesia—particularly vasodilation and decreased preload—can be a double-edged sword for patients with heart failure. On one hand, these effects may reduce the workload on the failing heart by decreasing afterload, potentially improving cardiac output in certain cases. On the other hand, excessive vasodilation and preload reduction can lead to hypotension and poor end-organ perfusion, particularly in patients who are heavily reliant on venous return to maintain cardiac output [16].

In addition to hemodynamic considerations, heart failure patients are often at risk of developing perioperative complications such as pulmonary edema, arrhythmias, and acute decompensation. These risks necessitate careful evaluation and optimization of the patient's cardiovascular status before administering spinal anesthesia. Furthermore, close intraoperative monitoring and judicious management of fluids and vasopressors are critical to minimizing adverse outcomes [15].

Overall, the interplay between spinal anesthesia and heart failure requires a nuanced understanding of both the anesthetic technique and the underlying pathophysiology. This background sets the stage for a comprehensive evaluation of the safety, benefits, and risks of spinal anesthesia in this high-risk population.

Methods. Search Strategy. To gather relevant literature for this review on the safety of spinal anesthesia in patients with heart failure, a comprehensive search was conducted across several scientific databases, including PubMed, Scopus, and Google Scholar. The search was focused on identifying peer-reviewed articles, clinical trials, meta-analyses, systematic reviews, and case reports that address the interaction between spinal anesthesia and heart failure.

Keywords and Search Terms. The following keywords and Boolean operators were used to ensure a wide but targeted search:

- "Spinal anesthesia" AND "heart failure"
- "Regional anesthesia" AND "cardiovascular risk"
- "Safety of spinal anesthesia" AND "heart failure patients"
- "Hemodynamic effects" AND "spinal anesthesia" AND "cardiac dysfunction"

Inclusion Criteria. The following criteria were used to select studies for review:

1. Time Frame: Studies published within the last 10 years (2013–2023) to ensure relevance to current clinical practice.

2. Study Types: Peer-reviewed original research articles, clinical trials, meta-analyses, systematic reviews, and case reports.

3. Population: Studies involving adult patients diagnosed with heart failure undergoing spinal anesthesia for surgical procedures.

4. Language: Articles published in English to ensure accessibility and accurate interpretation of findings.

5. Focus: Research specifically addressing the safety, benefits, or risks of spinal anesthesia in the context of heart failure.

Exclusion Criteria. The following studies were excluded:

1. Research focusing exclusively on other types of anesthesia (e.g., general, epidural) without discussing spinal anesthesia.

2. Studies involving pediatric populations or non-human subjects.

3. Articles lacking sufficient data on heart failure or failing to assess its interaction with spinal anesthesia.

4. Opinion pieces, editorials, or letters to the editor without substantive data.

Search Process. Initially, over 150 articles were identified based on the above search criteria. After screening the titles and abstracts, duplicates and irrelevant studies were excluded. The remaining articles were then evaluated based on their full text, and 40 studies were deemed relevant for inclusion in this literature review. These studies were further categorized based on the type of heart failure, surgical context, and outcomes assessed.

This structured approach ensures that the review includes robust and high-quality evidence to address the safety of spinal anesthesia in heart failure patients comprehensively.

Results. Physiological Impact. Spinal anesthesia directly affects cardiovascular parameters through its ability to block sympathetic nerve fibers. This results in:

- Decreased preload: Sympathetic blockade leads to venodilation, reducing venous return to the heart. In heart failure patients, who are often preload-dependent, this can decrease cardiac output and potentially lead to hemodynamic instability.

- Reduced afterload: Arterial vasodilation decreases systemic vascular resistance, which can be beneficial in reducing the workload of the heart and improving cardiac output in heart failure with reduced ejection fraction (HFrEF). However, this effect may be less favorable in heart failure with preserved ejection fraction (HFpEF),

where diastolic dysfunction limits the heart's ability to adapt to changes in vascular tone.

- Lower myocardial oxygen demand: By reducing both preload and afterload, spinal anesthesia may lower myocardial oxygen consumption, offering potential benefits in stable heart failure patients.

These effects highlight a complex interaction where spinal anesthesia can either benefit or pose risks depending on the patient's specific cardiac physiology and the extent of heart failure.

Evidence of Safety. Studies Supporting Safety in Stable Heart Failure. Clinical studies have demonstrated that spinal anesthesia is generally safe in patients with stable, compensated heart failure: A prospective cohort study found that spinal anesthesia was associated with lower rates of perioperative cardiac complications compared to general anesthesia in patients with mild to moderate heart failure. Case reports of patients with HFrEF undergoing lower abdominal or orthopedic surgeries under spinal anesthesia showed stable hemodynamic profiles when appropriate monitoring and fluid management were employed.

Risks and Contraindications. Despite its potential benefits, spinal anesthesia poses risks in certain heart failure patients:

- Hemodynamic Instability: Excessive sympathetic blockade can lead to profound hypotension, which may not be well-tolerated in patients with severe heart failure or those with HFpEF.

- Cardiac Function Worsening: Abrupt changes in preload and afterload can worsen cardiac function, particularly in decompensated heart failure.

- Contraindications: Patients with significant aortic stenosis, severe pulmonary hypertension, or ongoing acute decompensated heart failure are often unsuitable candidates for spinal anesthesia due to their limited ability to tolerate sudden hemodynamic shifts.

Comparison with General Anesthesia. Several studies have compared spinal and general anesthesia in patients with heart failure: Mortality: Retrospective analyses have shown similar or lower perioperative mortality rates with spinal anesthesia compared to general anesthesia in patients with heart failure undergoing non-cardiac surgery. Cardiac Complications: Spinal anesthesia has been associated with fewer cardiac arrhythmias, ischemic events, and instances of pulmonary edema compared to general anesthesia. This may be due to its ability to minimize myocardial oxygen demand and avoid the systemic effects of inhaled anesthetics. Hospital Stay: Patients receiving spinal anesthesia often experience shorter hospital stays and fewer ICU admissions due to reduced postoperative complications and quicker recovery times.

However, general anesthesia may still be preferred in patients where spinal anesthesia is contraindicated or if a prolonged surgical duration is anticipated.

Risk Mitigation Strategies. To optimize the safety of spinal anesthesia in heart failure patients, the following strategies are recommended: Preoperative Optimization: Stabilize heart failure symptoms through diuresis, vasodilators, or other appropriate therapies. Assess hemodynamic status and cardiac function with echocardiography or invasive monitoring when indicated. Intraoperative Monitoring: Use advanced monitoring techniques, including arterial lines and echocardiography, to track hemodynamic parameters in real-time. Maintain adequate preload with cau-

tious fluid administration to avoid exacerbating pulmonary congestion. Administer vasopressors such as phenylephrine or norepinephrine promptly to counteract significant hypotension. Dose Adjustment: Use low doses of local anesthetic to minimize the extent of sympathetic blockade and avoid abrupt hemodynamic changes. Postoperative Care: Closely monitor for signs of cardiac decompensation, including pulmonary edema or arrhythmias, in the immediate postoperative period. Collaborate with cardiologists to ensure optimal management of heart failure post-surgery.

By tailoring the anesthetic approach to each patient's unique physiological status, spinal anesthesia can be safely utilized in many patients with heart failure, providing effective pain control while minimizing perioperative risks.

Current Gaps in Knowledge. Despite the existing evidence on the use of spinal anesthesia in heart failure patients, significant gaps remain that limit our ability to draw definitive conclusions:

Lack of Large Randomized Controlled Trials (RCTs): Most available studies on the safety of spinal anesthesia in heart failure patients are observational or retrospective in nature. High-quality RCTs comparing spinal anesthesia to general or other regional anesthesia techniques in heart failure patients are scarce. This limits the ability to establish causation and develop evidence-based guidelines.

Insufficient Data on Severe Heart Failure Subgroups: The majority of studies focus on patients with mild to moderate heart failure (NYHA Class I–II). Limited data exist for patients with severe or decompensated heart failure (NYHA Class III–IV), who are at the greatest risk for hemodynamic instability during anesthesia.

Underrepresentation of HFpEF Patients: Heart failure with preserved ejection fraction (HFpEF) is increasingly prevalent, yet most studies do not differentiate between HFrEF and HFpEF in their analysis. Since these two conditions have distinct pathophysiological mechanisms, their responses to spinal anesthesia may differ significantly.

Limited Research on Long-Term Outcomes: Most studies focus on short-term perioperative outcomes such as hemodynamic stability and immediate complications. There is a paucity of data on the long-term effects of spinal anesthesia in heart failure patients, including its impact on cardiac function, recovery, and overall quality of life.

Inconsistent Use of Standardized Monitoring Protocols: The degree and method of intraoperative hemodynamic monitoring vary widely across studies, making it difficult to compare results. Standardized protocols for monitoring and managing spinal anesthesia in heart failure patients are needed.

Specific Populations and Comorbidities: Heart failure patients often present with multiple comorbidities, such as diabetes, chronic kidney disease, or pulmonary hypertension, which can influence their response to spinal anesthesia. Studies rarely account for these additional factors, leaving gaps in understanding how these conditions interact with anesthesia techniques.

Limited Evidence on Alternative Approaches: Research comparing spinal anesthesia with newer or alternative regional techniques, such as combined spinal-

epidural anesthesia, in heart failure patients is minimal. These techniques may offer additional benefits but remain underexplored in this population.

Addressing these gaps through focused research, particularly large multicenter RCTs, will be critical to advancing our understanding of the safety and efficacy of spinal anesthesia in patients with heart failure. This will also allow for the development of evidence-based clinical guidelines to optimize perioperative care in this high-risk population.

Clinical Implications. Implications for Anesthesiologists and Cardiologists. The current evidence suggests that spinal anesthesia can be a viable option for patients with heart failure, provided it is used cautiously and in well-selected cases. Its benefits, such as reduced myocardial oxygen demand and avoidance of systemic effects from general anesthesia, make it an attractive option, especially in stable heart failure patients. However, its associated risks, particularly hemodynamic instability due to sympathetic blockade, require meticulous perioperative management. Collaboration between anesthesiologists and cardiologists is essential to optimize outcomes. Key clinical implications include:

1. **Preoperative Optimization:** Cardiologists should ensure heart failure is stabilized preoperatively by managing fluid overload, optimizing medications such as beta-blockers, ACE inhibitors, or diuretics, and addressing comorbidities. This preparation reduces the risk of perioperative complications.

2. **Tailored Anesthetic Approach:** Anesthesiologists should carefully plan spinal anesthesia techniques, including choosing appropriate doses of local anesthetics to minimize sympathetic blockade and mitigate hemodynamic shifts. Advanced monitoring tools may be necessary for real-time assessment of cardiovascular status.

3. **Intraoperative and Postoperative Monitoring:** Continuous hemodynamic monitoring is critical to detect and promptly manage hypotension or other complications. Postoperatively, patients should be closely observed for signs of decompensation, particularly pulmonary edema and arrhythmias.

4. **Collaborative Decision-Making:** Multidisciplinary discussions between anesthesiologists, cardiologists, and surgeons should guide the decision to use spinal anesthesia. This ensures alignment of goals and readiness to manage potential complications.

Patient Selection Criteria for Spinal Anesthesia in Heart Failure. Not all heart failure patients are ideal candidates for spinal anesthesia. Proper patient selection is crucial to minimizing risks and optimizing outcomes. The following criteria can help guide decision-making [10-16]:

1. **Stable Heart Failure (NYHA Class I–II):** Patients with stable, well-compensated heart failure are generally better candidates for spinal anesthesia. Hemodynamic stability increases the likelihood of tolerating the physiological effects of spinal anesthesia.

2. **Ejection Fraction and Cardiac Reserve:** Patients with moderate to good cardiac reserve and preserved or mildly reduced ejection fraction (HFrEF >30%) are more likely to tolerate the preload and afterload changes induced by spinal anesthesia. Patients with severely reduced ejection fraction (<30%) require more careful consideration and monitoring.

3. Hemodynamic Optimization: Candidates should be free of acute decompensation, including pulmonary edema or worsening dyspnea, at the time of surgery. Blood pressure and fluid status should be optimized preoperatively.

4. Low Risk of Hemodynamic Instability: Patients with conditions like severe aortic stenosis, hypertrophic cardiomyopathy, or significant pulmonary hypertension are not ideal candidates due to their inability to tolerate sudden changes in preload and afterload.

5. Type and Duration of Surgery: Spinal anesthesia is most suitable for shorter, lower-risk procedures (e.g., orthopedic or lower abdominal surgeries) where its duration matches the surgical needs. For prolonged or complex surgeries, alternative techniques like epidural or combined spinal-epidural anesthesia may be preferable.

6. Comorbidities: Comorbid conditions such as diabetes, chronic kidney disease, or obesity should be considered, as these can affect perioperative hemodynamic stability and recovery.

7. Patient Monitoring and Support: The availability of advanced hemodynamic monitoring and access to vasoactive medications is essential when selecting spinal anesthesia for heart failure patients. The ability to quickly convert to general anesthesia if necessary is also critical.

By adhering to these guidelines, anesthesiologists and cardiologists can enhance the safety and effectiveness of spinal anesthesia in heart failure patients, ensuring optimal perioperative outcomes and minimizing risks.

Conclusion. Spinal anesthesia offers significant advantages in certain patient populations, including reduced myocardial oxygen demand, avoidance of systemic effects from general anesthesia, and faster recovery times. In patients with heart failure, these benefits can be particularly valuable when the technique is carefully applied. However, the hemodynamic changes induced by spinal anesthesia—such as reduced preload and afterload—can pose risks, particularly for those with severe or decompensated heart failure. Current evidence suggests that spinal anesthesia is generally safe in stable heart failure patients (NYHA Class I–II) when used with appropriate monitoring, optimized dosing, and preoperative stabilization. Conversely, its use in patients with severe heart failure (NYHA Class III–IV) or significant comorbidities requires heightened caution and individualized risk assessment.

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БЕЗОПАСНОСТЬ СПИНАЛЬНОЙ АНЕСТЕЗИИ У ПАЦИЕНТОВ С СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТЬЮ

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Резюме. Цель: Данный обзор литературы направлен на оценку безопасности спинальной анестезии у пациентов с сердечной недостаточностью с акцентом на ее физиологические эффекты, доказательства безопасности и стратегии снижения рисков. Методы: Был проведен комплексный поиск литературы в базах данных PubMed, Scopus и Google Scholar. Использовались ключевые слова: «спинальная анестезия», «сердечная недостаточность», «безопасность», «гемодинамические эффекты». Были включены исследования, опубликованные за последние 10 лет, в которых рассматривались безопасность, преимущества и риски спинальной анестезии у взрослых пациентов с сердечной недостаточностью. Анализировались наблюдательные исследования, клинические испытания, метаанализы и клинические случаи. Результаты: Спи-

нальная анестезия может предложить значительные преимущества для пациентов с компенсированной сердечной недостаточностью, включая снижение потребности миокарда в кислороде и улучшение сердечного выброса за счет уменьшения постнагрузки. Клинические исследования демонстрируют в целом благоприятный профиль безопасности спинальной анестезии у пациентов с стабильной сердечной недостаточностью (NYHA I–II) при условии проведения тщательного мониторинга. Однако риски, такие как гипотензия, декомпенсация сердечной деятельности и ухудшение перфузии, остаются значительными, особенно у пациентов с тяжелой или декомпенсированной сердечной недостаточностью (NYHA III–IV). В некоторых исследованиях спинальная анестезия была связана с меньшим количеством периоперационных осложнений по сравнению с общей анестезией, включая более низкий уровень аритмий и отека легких. Индивидуализированный подход, включающий предоперационную оптимизацию, тщательный мониторинг и рациональное использование вазопрессоров, является ключевым для улучшения исходов. Заключение: Спинальная анестезия является приемлемым вариантом для пациентов с стабильной сердечной недостаточностью при условии соблюдения осторожности и индивидуального подхода. Однако ее применение у пациентов с тяжелой или декомпенсированной сердечной недостаточностью требует тщательной оценки рисков и усиленного интраоперационного контроля. Необходимы дополнительные исследования, включая крупные рандомизированные контролируемые испытания и субгрупповой анализ, для разработки стандартизированных рекомендаций и изучения альтернативных техник.

Ключевые слова: спинальная анестезия, сердечная недостаточность, гемодинамические эффекты, регионарная анестезия, периоперационная безопасность, сердечная дисфункция.