Review
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ENHANCED RECOVERY AFTER CESAREAN SECTION: CURRENT TRENDS

Ubrzani oporavak nakon carskoga reza: trenutni trendovi

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Summary

Enhanced Recovery after Surgery (ERAS) protocols are multimodal perioperative care pathways designed to achieve early recovery for patients undergoing major surgical procedures. These evidence-based care improvement protocols have become standard for multiple surgical procedures in urology, gynaecology, orthopaedic and breast surgery. Over the last two decades these protocols have gained popularity in obstetrics due to improvements in both maternal and neonatal outcomes. Caesarean Section ERAS protocols are increasingly promoted and have now become widely accepted mostly in high income countries. The ERAS for Caesarean Section covers the entire perioperative period; including preoperative, intraoperative, and postoperative periods, based on multimodal treatments given by a multidisciplinary team consisting of obstetricians, anesthesiologists, midwives, nurses and neonatologists. Barriers for ERAS implementation are lack of manpower and managerial support, poor communication and collaboration among perioperative services and a resistance to shifting away from outdated practices. ERAS protocols should therefore be adapted to incorporate local hospital policies and practices, adjusted to suit obstetric patients and regularly reviewed and updated.

Sažetak

Protokoli za ubrzani oporavak nakon kirurških zahvata (ERAS) su višemodalni perioperativni postupci osmišljeni za brži oporavak bolesnika koji se podvrga-

Ključne riječi:
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vaju većim kirurškim zahvatima. Ovi protokoli utemeljeni na dokazima postali su standard u više kirurških područja, uključujući urologiju, ginekologiju, ortopediju i kirurgiju dojke. Tijekom posljednja dva desetljeća ERAS načela sve su popularnija u porodništvu zbog poboljšanih ishoda u majke i dijeteta. ERAS protokoli za carski rez sve više se promoviraju u posljednje vrijeme i danas su široko prihvaćeni, osobito u razvijenim zemljama. ERAS za carski rez obuhvaća cijelo perioperacijsko razdoblje, uključujući prijeopearcijsko, intraoperacijsko i poslijeoperacijsko razdoblje, a temelji se na višemodalnim postupcima provedenim od strane multidisciplinarnog tima sastavljenog od opstetričara, anesteziologa, primalja, medicinskih sestara i neonatologa. Prepreke za provedbu uključuju nedostatak osoblja i podrške vodstva bolnice, lošu komunikaciju među perioperativnim službama te otpor prema novim smjernicama. Zbog navedenih razloga, ERAS protokole treba prilagoditi lokalnim bolničkim okolnostima, prilagoditi ih potrebama bolesnica, te ih redovito preispitivati i mijenjati u skladu s trenutnim okolnostima.

INTRODUCTION

Enhanced Recovery after Surgery (ERAS) protocols are multimodal perioperative care pathways designed to achieve early recovery with better outcome for patients undergoing major surgical procedures. These protocols were initiated by Professor Henrik Kehlet, Danish surgeon, in 1997, initially focussing on recovery following colorectal surgery.[1] Over the last two decades, ERAS protocols have become standard for multiple surgical procedures in urology, gynaecology, orthopaedic and breast surgery. ERAS protocols are evidence-based care improvement pathways for surgical patients, based on a multidisciplinary and multimodal approach to the care of surgical patients in the perioperative period. Majority of protocols have been developed and published under an umbrella of the ERAS Society. The ERAS Society is an international nonprofit professional society that promotes, develops, and implements ERAS programs, publishes regularly updated guidelines for many operations. These guidelines include parts of modern evidence-based care, such as overnight fasting, encouraging carbohydrate drinks two hours before surgery, minimally invasive surgical approaches instead of large incisions, perioperative management of fluids to seek balance, avoidance or early removal of drains and tubes, early mobilization, and the serving of drinks and food the day of the operation. Implementation of ERAS programs have resulted in major improvements in clinical outcomes and cost reduction.[2]

Caesarean section (CS) remains one of the most common surgical procedures in obstetrics. Unlike normal vaginal delivery, women undergoing CS have a prolonged recovery, longer hospital stay, and they are generally more dissatisfied. Benefits of standardizing protocols in obstetrics show improvements in both maternal and foetal outcomes. National Institute for Health and Care Excellence (NICE) guidelines from the United Kingdom encourage institutions to implement ERAS protocols in their obstetric units.[3,4] To implement the ERAS protocol successfully in a clinical practice, practical strategies based on a sufficient understanding of ERAS components and their outcomes are necessary.[5]

The aims of this review article are to summarize the elements of the ERAS protocol which apply to patients having Caesarean sections, to evaluate the outcomes of ERAS in elective CS and suggest practical strategies to implement the ERAS protocol successfully.

ELEMENTS OF THE ERAS PROTOCOL FOR ELECTIVE CAESAREAN SECTION

The ERAS elements cover the entire perioperative period, including preoperative, intraoperative, and postoperative periods, based on multimodal treat-

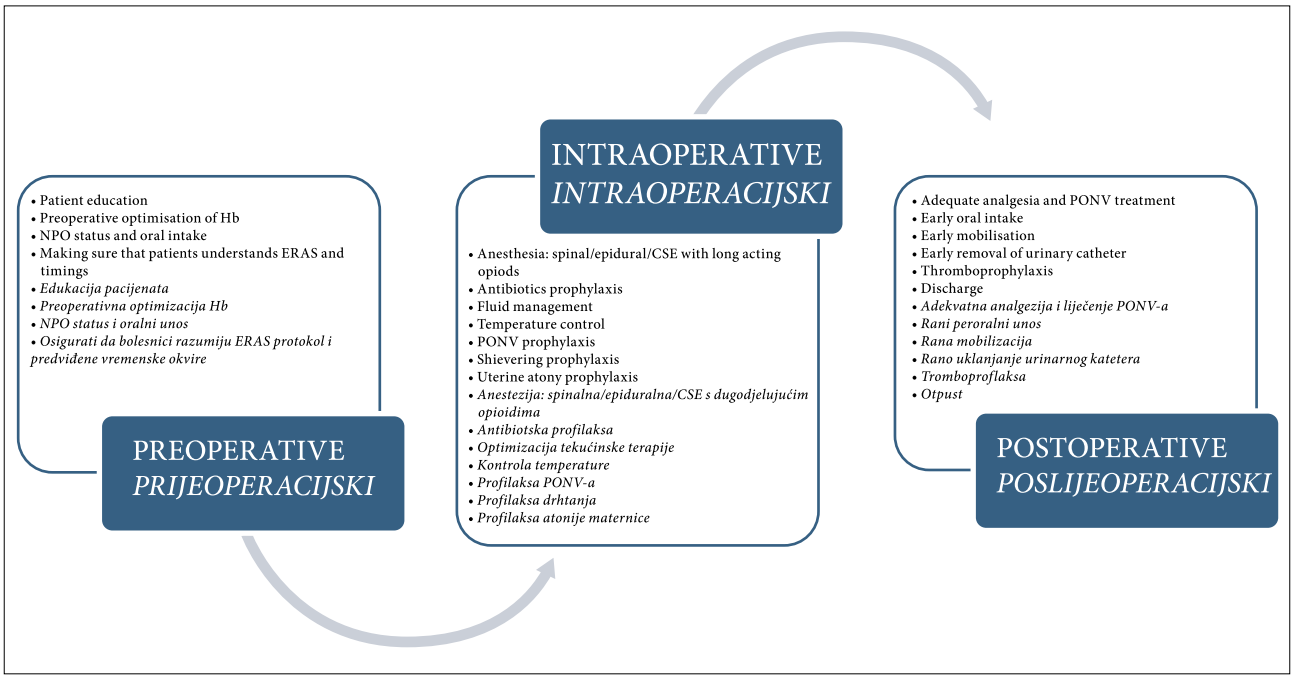

Figure 1 Components of Caesarean section ERAS protocol
Slika 1. *Sastavnice ERAS protokola kod carskog reza*

*Hb - hemoglobin; NPO - nothing by mouth; CSE - combined spinal-epidural; PONV - postoperative nausea and vomiting
Hb - hemoglobin; NPO - ništa na usta; CSE - kombinirano spinalno-epiduralno; PONV - postoperativna mučnina i povraćanje

ments given by a multidisciplinary team consisting of obstetricians, anesthesiologists, midwives, nurses and neonatologists. The key components of CS ERAS protocol are summarised in Figure 1.

PREOPERATIVE COMPONENTS

Parturient education

It is well known that patients with adequate prior knowledge about a proposed surgical intervention will become more involved in their treatment and postoperative recovery. Parturient education antenatally plays an important role in the ERAS pathway. Patients should be given all necessary information (via community midwives, antenatal community and hospital clinics or via leaflet and special booklets) about CS and the ERAS components to encourage their active participation in the process. Patient's activation and engagement in the process improve both their satisfaction and obstetric outcomes.[6,7] Alongside with general education related to CS, each parturient antenatally should be educated about breastfeeding due to its positive impact on child's general heath and neurodevelopment. Hospitals should therefore encourage and support the initiation and maintenance of breastfeeding.[8] Furthermore, education about basic care of the newborn given in hospital by qualified staff is also very important to promote reduced stress and anxiety after mother and baby have been discharged from the hospital.

Haemoglobin optimisation before planned Caesarean section

Anaemia in pregnancy is a major public health problem, and the World Health Organization estimates that 37% of all pregnancies are affected by anaemia.[9] Anaemia in pregnancy is defined by Hemoglobin (Hb) <110g/l in the first trimester, <105g/l in the second and third trimesters and <100g/l in the postpartum period. Anaemia in pregnant patients is associated with adverse maternal outcomes, such as preterm delivery, placental abruption, intensive care unit admission, as well as adverse neonatal outcome - including

stillbirth, growth restriction and neurodevelopmental effects.[10,11,12] Also, hemoglobin optimisation antenatally is related to better cognitive function and mood in the postpartum period. During pregnancy blood volume increases more than the volume of red blood cells which causes dilutional anaemia – a normal maternal adjustment to the pregnancy. Unfortunately, some women have pre-existing anaemia before a conception which can undoubtedly contribute to worsening anaemia in pregnancy. The most common reason for developing anaemia during pregnancy is iron deficiency, but folic acid or vitamin B12 deficiencies can also contribute to anaemia. Considering possible significant blood loss during and after CS, preexisting anaemia should be evaluated, treated and corrected accordingly. The British Society for Haematology (BSH) recommends assessment of full blood count (FBC) at booking and at 28 weeks. All women should be given dietary information to maximise iron intake and absorption. Women with established iron deficiency anaemia should be given 100-200mg elemental iron daily. They should be advised on correct administration to optimise absorption. Referral to secondary care should be considered if there are significant symptoms, severe anaemia (Hb<70 g/l), anaemia in late gestation (>34 weeks) or if there is failure to respond to a trial of oral iron.[13]

NPO (nothing by mouth) status and oral intake

Limiting the preoperative fasting interval is a key component of all ERAS pathways, due to the importance of reducing both metabolic stress and ketosis.[14] High-risk obstetric population requires a balancing of the classical NPO approach against a more liberal approach (non-particulate carbohydrate drinks allowed) to prevent aspiration of gastric contents. Studies in nonlaboring women scheduled to undergo a caesarean delivery suggest that gastric emptying is not decreased compared to their nonpregnant counterpart. Therefore, carbohydrate loading with nonparticulate liquids (E.g., clear apple juice) up to two hours before scheduled caesarean delivery is recommended.[7,15]

Communication and understanding of CS ERAS plan

Adequate and accurate information given in a timely manner from healthcare professionals is important to ensure patients' full engagement in the ERAS process. Patients should be fully informed about ERAS elements concisely, and any ambiguities should be clarified antenatally. Furthermore, patient's awareness of important timings (i.e., preoperative screening tests, fasting from solid food, hospital admission on the day of CS) will help facilitate the smooth running of the elective theatre list. Each patient must be aware of when and where to ask for help after hospital discharge, which is most commonly via maternity assessment units, emergency obstetric clinics or directly via delivery suites.

INTRAOPERATIVE COMPONENTS

Anaesthetic considerations

Anesthetic options for CS include neuraxial techniques (spinal, combined spinal-epidural or extension of labour epidural analgesia to surgical anesthesia) and general anesthesia. There is increasing evidence of the benefit of neuraxial techniques over general anaesthesia in terms of maternal and foetal outcomes. Regional anesthetic techniques are nowadays the preferred methods for elective CS and, as such, these form a large part of hospitals' ERAS protocols. All pregnant women having a planned caesarean birth should be provided with information on the different types of anesthetic techniques well in advance, so that they can make an informed choice. Neuraxial anesthesia may be desirable both socially and emotionally, as in contrast to general anesthesia, a birth partner is usually encouraged to be present in the operating room for delivery, and skin-to-skin contact can be established very soon after delivery.[16] Intraoperative anesthetic elements of ERAS are summarised in Table 1. It is important to emphasize that most ERAS protocols exclude women having CS under general anesthesia.

Table 1 Intraoperative anesthetic elements of ERAS
Tablica 1. *Intraoperativne sastavnice ERAS protokola*

ELEMENT	TREATMENT / *LIJEČENJE*	COMMENT/PRIMJEDBA
Spinal anesthesia *Spinalna anestezija*	• Heavy Bupivacaine 10-15 mg +/- PF Diamorphine 300-500 mcg • Heavy Bupivacaine +/- PF Fentanyl 20 mcg +/- PF Morphine 100 mcg • Levobupivacaine 12.5-15 mg +/- opioid • *Hiperbarični bupivakain 10-15 mg +/- PF Diamorfin 300-500 mcg* • *Hiperbarični bupivakain +/- PF Fentanil 20 mcg +/- PF Morfin 100 mcg* • *Levobupivakain 12,5-15 mg +/- opioid*	• Doses and mixtures can vary; these are commonly used across United Kingdom • Long-acting opioid added to LA improves postoperative analgesia • If long lasting opioid used, patient must be monitored regularly for signs of respiratory depression and cardiovascular instability • *Doze i mješavine mogu varirati; navedene se često koriste diljem Ujedinjenog Kraljevstva* • *Dodatak dugodjelujućeg opioidnog analgetika lokalnom anestetiku poboljšava postoperativnu analgeziju* • *Ako se koristi dugodjelujući opioid, bolesnika treba redovito nadzirati zbog mogućeg razvoja respiratorne depresije i kardiovaskularne nestabilnosti*
Combined Spinal-Epidural anesthesia (CSE) *Kombinirana spinalno-epiduralna anestezija (KSE)*	•Heavy Bupivacaine 5-10 mg +/- opioid intrathecally and epidural block extension to desired level • *Hiperbarični bupivakain 5-10 mg +/- opioid intratekalno i ekstenzija epiduralnog bloka do željene razine*	• Mostly when prolonged surgery expected (previous abdominal surgery, PAS, obesity) • Great choice for pregnant cardiac patients; offers gradual onset with less cardiovascular instability • *Uglavnom kada se očekuje dugotrajna operacija (prethodna abdominalna operacija, PAS, pretilost)* • *Izvrstan izbor kod trudnica s kardiološkim problemima; nudi postupan početak djelovanja s manjom kardiovaskularnom nestabilnošću*
Regional Anesthesia induced hypotension *Hipotenzija izazvana regionalnom anestezijom*	• Start prophylactic vasopressor infusion immediately after SA sited • Phenylephrine (100 mcg/ml) 10-40 ml/h • Noradrenaline is a good alternative • *Započnite profilaktičku infuziju vazopresora odmah nakon izvođenja spinalnog bloka* • *Fenilefrin (100 mcg/ml) 10-40 ml/h* • *Noradrenalin je dobra alternativa*	• Usually caused by decreased afterload • Can severely compromise uteroplacental perfusion; must be treated aggressively • Often related to increased IONV • Caution needed in preeclamptic patients – adjust vasopressor dose accordingly • *Obično uzrokovana smanjenim naknadnim opterećenjem* • *Može ozbiljno ugroziti uteroplacentalnu perfuziju; mora se agresivno liječiti* • *Često povezana s ucestalijim IONV-om* • *Potreban je oprez kod bolesnica s preeklampsijom* *– potrebno je prilagoditi dozu vazopresora*
Fluid management *Nadoknada tekućina*	• Balanced crystalloid solutions up to 3 litres • *Uravnotežene kristaloidne otopine do 3litre*	• RA induced hypotension should be primarily treated with vasopressors • Treat significant obstetric bleeding using hospital haemorrhage protocol • *Hipotenziju uzrokovanu regionalnom anestezijom treba prvenstveno liječiti vazopresorima* • *Značajno opstetričko krvarenje zbrinjavati sukladno važećem bolničkom protokolu*
Temperature control *Kontrola temperature*	• Consider active warming of i.v. fluids alongside with adequate operating room temperature control • Active patient warming (i.e., Bair hugger, Hot-dog warmer) • *Razmotriti aktivno zagrijavanje intravenskih tekućina uz odgovarajuću kontrolu temperature operacijske sale* • *Aktivno zagrijavanje bolesnika (npr. Bair hugger, hot-dog grijač)*	• Important for adequate clotting, skin-to skin contact, maternal satisfaction, etc. • *Važno za adekvatnu hemostazu, kontakt kože između majke i djeteta, za zadovoljstvo majke itd.*

Shivering prevention *Sprječavanje drhtavice*	• Small doses of i.v. opioids, Ketamine, Dexmedetomidine, Clonidine • $MgSO_4$ showed benefit too • *Male doze intravenskih opioida, ketamina, deksmedetomidina, klonidina* •*$MgSO_4$ također može biti od koristi*	• Increases oxygen consumption • Decreases maternal satisfaction • *Povećava potrošnju kisika* • *Smanjuje majčino zadovoljstvo*
IONV/PONV prophylaxis *Profilaksa IONV/PONV*	• Aggressively treat RA-induced hypotension with vasopressors • Prophylactically use antiemetics: - $5HT_3$ antagonists (i.e., Ondansetron 4 mg i.v.) - Corticosteroids (Dexamethasone 3.3-6.6 mg i.v.) - Dopamine antagonists (e.g., Metoclopramide 10 mg i.v.) • *Hipotenziju uzrokovanu regionalnom anestezijom agresivno liječiti vazopresorima* • *Profilaktički koristiti antiemetike:* *- $5HT_3$ antagoniste (npr. Ondansetron 4 mg i.v.)* *- Kortikosteroidi (Deksametazon 3.3-6.6 mg i.v.)* *- Antagonisti dopaminskih receptora (npr. Metoklopramid 10 mg i.v.)*	• RA-induced hypotension is the commonest cause of IONV • Intrathecal opioids and opioids given for pain relief are mostly the cause for PONV • Antiemetics achieve the best result by combining of two different mechanisms • *Hipotenzija izazvana regionalnom anestezijom najčešći je uzrok intraoperacijske mučnine i povračanja (IONV)* • *Intratekalni opioidi i opioidi koji se daju za ublažavanje boli uglavnom su uzrok PONV-a* • *Antiemetici postižu najbolji rezultat kada se kombiniraju dva različita mehanizama antiemetskog djelovanja*
Initiation of multimodal analgesia *Započimanje multimodalne analgezije*	• Add long-acting opioid to LA for CNB (Morphine, Diamorphine) • Combine Paracetamol (up to 1g i.v.) with NSAID: - Diclofenac 50-100 mg PR/i.v. or - Ibuprofen 400 mg i.v. or - Ketorolac 15-30 mg i.v. • Consider LA wound infiltration, TAP or QL block if long-action opioid not given in CNB • *Dodati dugodjelujući opioid uz LA kod CNB (morfij, diamorfin)* • *Kombinirati Paracetamol: (do 1g i.v.) i:* *- Diklofenak 50-100 mg PR/i.v. ili* *- Ibuprofen 400 mg i.v. ili* *- Ketorolak 15-30 mg i.v.* • *Razmotriti infiltraciju rane s lokalnim anestetikom, TAP ili QL blok ako se dugodjelujući opioid nije koristio kod CNB*	• Beware of possible side-effects of opioids given as adjuvants for CNB; ensure regular monitoring in place on the ward • Start nonopioid analgesia at the end of operation • *Paziti na moguće nuspojave opioida koji se daju kao adjuvansi za CNB; osigurajte redovito praćenje vitalnih parametara na odjelu* • *Započeti s neopioidnom analgezijom na kraju operacije*

*PF - preservative free; LA - local anesthetic; PAS - placenta accreta spectrum; IONV - intraoperative nausea and vomiting; RA - regional anesthesia; PONV - postoperative nausea and vomiting; 5HT3 - 5-hydroxytryptamine 3 receptor; CNB - central neuraxial blocks; NSAID - non-steroidal anti-inflammatory drug; PR - per rectum; TAP - transversus abdominis plane; QL - quadratus lumborum.
**PF - bez konzervansa; LA - lokalni anestetik; PAS - spektar placenta accreta; IONV - intraoperativna mučnina i povraćanje; RA - regionalna anestezija; PONV - postoperativna mučnina i povraćanje; 5HT3 - 5-hidroksitriptamin 3 receptor; CNB - centralni neuraksijalni blokovi; NSAID - nesteroidni protuupalni lijek; PR - per rectum; TAP - transversus abdominis plane; QL - quadratus lumborum.*

Adapted from Society for Obstetric Anesthesia and Perinatology (SOAP) recommendations [7], modified for European practice.
Prilagođeno prema preporukama Društva za opstetričku anesteziju i perinatologiju (SOAP) [7], prilagođeno za europsku praksu.

Antibiotic prophylaxis

The World Health Organisation (WHO), NICE in the United Kingdom and the American College of Obstetricians and Gynecologists (ACOG) in the United States recommend that antibiotic prophylaxis should be given before skin incision. The choice of antibiotic should be appropriate to prevent the common infective complications after such surgery. One of the preferred surgical antibiotic prophylaxis combinations for CS is cefuroxime and metronidazole, but due to increased bacterial resistance it is important to follow national and local antimicrobial prophylaxis guidelines.[3,17,18]

Delayed umbilical cord clamping

Delayed umbilical cord clamping is carried out more than 1 minute after the birth or when cord pulsation has ceased. There is growing evidence that delayed cord clamping is beneficial and can improve the infant's iron status for up to 6 months after birth. Also, it can have a positive impact on neurodevelopmental outcomes, lowers the risk of necrotising colitis, intraventricular haemorrhage and late onset sepsis. Some trials indicate that a less blood-filled placenta shortens the third stage of labour and decreases the incidence of retained placenta which is of immediate benefit to the mother. Delayed cord clamping should be deferred if immediate infant resuscitation needed or there is significant maternal compromise.[7,19]

Uterine atony prophylaxis

Postpartum Haemorrhage (PPH) is commonly defined as a blood loss of 500 ml or more within 24 hours after birth. PPH is the leading cause of maternal mortality in low-income countries and the primary cause of nearly one quarter of all maternal deaths globally. It is thought that most of these cases could be avoided using prophylactic uterotonics.[20,21] Prophylactic use of uterotonic is a well-established measure in high- and middle-income countries, with a significant inequality in low-income countries. Society of obstetric anesthesia and perinatology (SOAP) recommends a use of the lowest uterotonic dose to achieve adequate uterine tone with causing minimal side effects. They suggest using bolus of 1 International unit (IU) of Oxytocin and a continuous infusion of Oxytocin at a rate of 2.5-7.5 IU per hour in elective CS.[7] British NICE recommends the use of oxytocin 5 IU by slow intravenous injection in caesarean birth to encourage contraction of the uterus and decrease blood loss. Widely accepted practice across the UK is giving 5 IU of Oxytocin after the umbilical cord is clamped followed by a 10 IU/h continuous infusion for 4 hours.[3,21] The International Federation of Gynaecology and Obstetrics (FIGO) and the International Confederation of Midwives (ICM) issued a joint statement on the use of uterotonics to manage and reduce the complications of PPH in July 2021. Oxytocin is supported as the first-line uterotonic and needs continuous cold chain preservation to remain effective. Oxytocin is the recommended uterotonic for preventing and treating PPH, but heat-stable Carbetocin should be considered as an alternative to oxytocin, especially in low resource countries where transportation and reliable drug storage can be a challenge.[22]

Skin to skin contact

Skin-to-skin contact (SSC) is commonly performed after normal vaginal delivery and there is an increased demand by mothers to perform SSC after Caesarean section too. Numerous benefits of SSC on infant health and well-being were described, such as reduced risk of infections and hypoglycaemic episodes, improved oxyhaemoglobin saturation and infant temperature, as well as prolonged duration of breastfeeding. SSC improves mother-infant bonding and reduces maternal anxiety and early depression.[23,24,25] SOAP recommends that skin to skin contact should occur as soon as possible in the operating room if it is safe and should be ideally facilitated by another nurse or non-anaesthesia provider. According to SOAP, breastfeeding should also be initiated in the first hour after delivery.[7] It is also important to maintain normal maternal and infant temperature, which can be achieved by controlled room temperature, warmed intravenous fluids and forced air warmers.

POSTOPERATIVE COMPONENTS

Adequate postoperative analgesia and PONV treatment

Caesarean section is in general a major abdominal surgery and it is associated with a moderate-to-severe postoperative pain. Poor postoperative pain control will impact on mother's experience and satisfaction, as will undoubtedly increase maternal morbidity through increased thromboembolism, chronic pain and respiratory compromise. Furthermore, poorly controlled pain after CS will compromise maternal ability to care for and interact with the neonate, impair maternal–neonatal bonding, reduce the likelihood of successful breastfeeding and may also contribute to postnatal depression.[26] Caesarean Section ERAS protocols emphasize the importance of multimodal analgesia regimens after CS to promote fast recovery with less side-effects. The opioid crisis is an emerging problem worldwide and therefore it is important to utilize other effective analgesic options. Implementation of multimodal pain regimens following Caesarean delivery, which incorporate both pharmacologic (nonsteroidal anti-inflammatory drugs, laxatives) and nonpharmacologic methods (abdominal binders, deep breathing, mobilising) can be effective for pain control and may decrease postoperative opioid prescribing needs, thus mitigating the potential for opioid misuse and dependence.[27,28] Non-opioid analgesia should be prescribed as a scheduled or regular regime alongside opioid drugs for breakthrough pain. Figure 2. shows an example of adequate postoperative analgesic strategies after Caesarean section. Opioid analgesics transfer to breast milk and can possibly cause neonatal sedation and life-threatening respiratory depression, so these should be used with caution. Non-opioid analgesic Metamizole, which is commonly used in some European countries for postoperative analgesia, shouldn't be used during breastfeeding according to European Medicines Agency due to possible

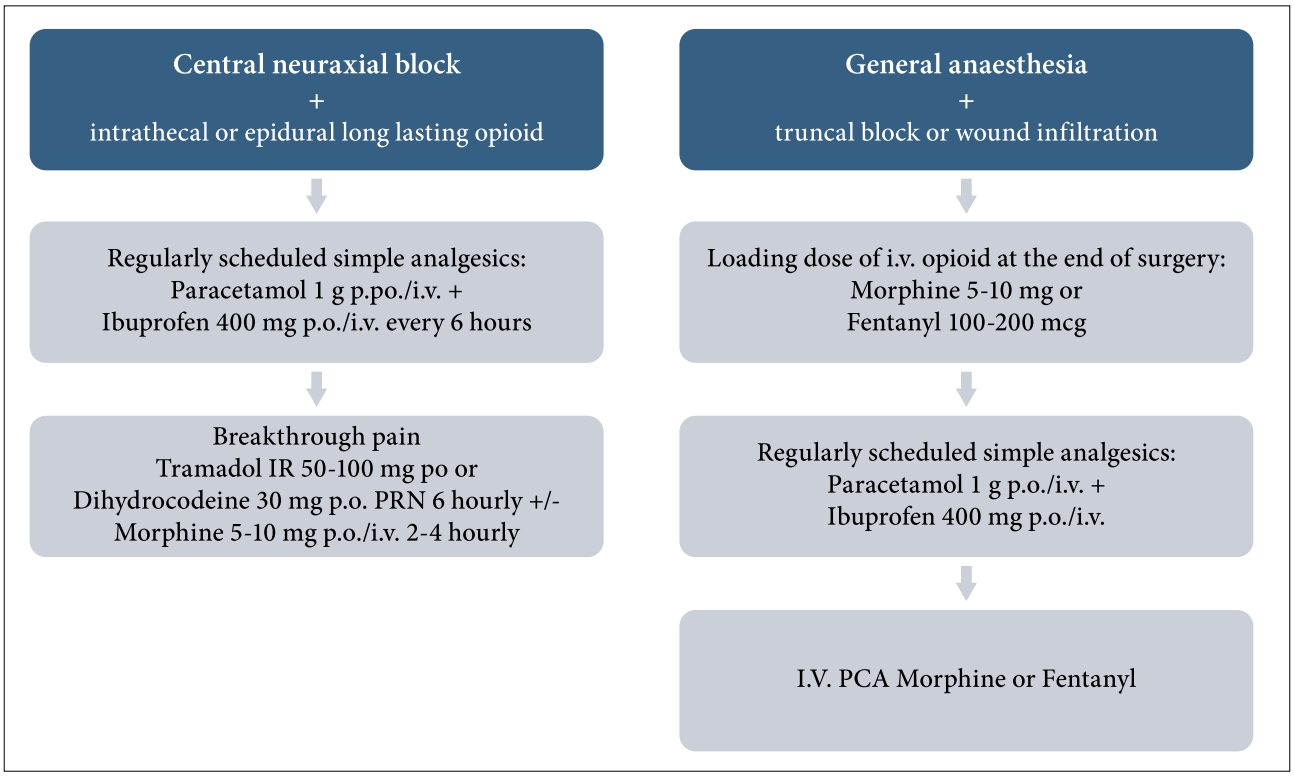

Figure 2 Possible postoperative analgesic strategies after Caesarean section
Slika 2. *Moguće strategije poslijeoperacijske analgezije nakon carskog reza*

*Abbreviations: p.o. - per os; i.v. - intravenously; IR - immediate release; PRN - when required; I.V. PCA - intravenous patient-controlled analgesia
**Kratice: p.o. - per os; i.v. - intravenski; IR - trenutno oslobađanje; PRN - po potrebi; I.V. PCA - intravenska analgezija kojom upravlja bolesnik*

high transfer of drug into breastmilk. Anti-emetics, antipruritics and laxatives should also be prescribed to manage opioid-induced adverse effects, such as nausea, vomiting, pruritus and constipation.[26,29] Postoperative nausea and vomiting are usually treated with as required use of Ondansetron 4 mg intravenously or Cyclizine 50 mg intravenously, bearing in mind the daily maximum doses of mentioned antiemetics. Due to limited data about effects of antipsyhotics one the breast-fed infant, Prochlorperazine 12.5 mg i.m. and Droperidol 0.625 mg i.v. should be used only as a rescue antiemetic drugs.

Early oral intake and bowel function return

Early oral intake improves bowel function, shortens the time taken for first bowel evacuation, decreases catabolism and shortens the length of hospital stay. Early oral intake is not associated with increased rates of gastrointestinal complications or risk of PONV in the non-obstetric and obstetric population.[7,30] Therefore, with this in mind, women should be offered food and drink within 1 hour of transfer to the post-natal ward. Minimal use of opioids postoperatively will help with faster bowel function return. Laxatives can be also prescribed if required, i.e. Senokot 7.5 mg required at night or Lactulose 15 ml twice daily.

Early mobilisation

Early mobilisation has various benefits such as decreased insulin resistance, muscle atrophy, rate of venous thromboembolism, respiratory complications and length of hospital stay. Barriers to early mobilisation should be removed (i.e., intravenous fluids and urinary catheters), pain must be under control and nausea and vomiting should be absent. Ambulation should start only after any CNB has resolved and woman has motor function back.[7]

Early urinary catheter removal

Urinary catheters should be removed between 6 and 12 hours after CS. Prolonged urinary catheter time can cause longer immobilisation, longer hospital stay and more frequent urinary tract infections.[7,31] Women should void at least 300ml of urine within 6 hours of catheter removal and if unable should be reviewed and treated accordingly.

Thromboprophylaxis

Caesarean Section doubles the risk of venous thromboembolic (VTE) events compared to normal vaginal delivery. Fortunately, the risk is very low in otherwise healthy patients. Individualised VTE risk assessment and appropriate prescription for mechanical (thrombo-embolus deterrent stockings) or pharmacological prophylaxis (low molecular heparin) should be done before the patient leaves the theatre suite. As mentioned before, early mobilisation and good hydration should also be encouraged to decrease VTE risk.[3,7,31,32]

Discharge

Clinical review should occur by obstetric and anaesthetic teams the morning after surgery. Expected timeframe for hospital discharge is usually between 24 and 36 hours after surgery in non-complicated patients. Postoperative full blood count should be checked if there are any concerns prior to discharge. Patients should be informed when it is safe to resume activities such as driving a vehicle, carrying heavy items, formal exercise and sexual intercourse when they feel they have fully recovered from the caesarean birth.[3,31] They should be educated about wound care and breastfeeding after hospital discharge. Also, information about possible complications and how to get further advice and treatment if needed should be explained.

CONCLUSION

ERAS protocols have gained popularity in various surgical specialities due to their association with improved patient outcomes, shorter hospital stays, better patient experience and reduced costs of treatment. ERAS has gradually emerged as the gold standard for perioperative care of women un-

dergoing planned Caesarean section in numerous healthcare facilities worldwide. Implementation of these protocols in the obstetric population is a challenge because specific elements for both maternal and newborn' care goals, standards and outcomes are necessary. Each ERAS CS protocol must follow the principles of evidence-based medicine and ensure the highest quality of safe maternal perioperative care. Importantly, it is crucial to make sure women can take care of both herself and the newborn following hospital discharge. Barriers for ERAS implementation are lack of manpower and managerial support, poor communication and collaboration among perioperative services and resistance to shifting away from outdated practices. ERAS protocols should be adapted to incorporate local hospital policies and practice, adjusted to fit obstetric patients and regularly reviewed and updated.

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