DOI: *10.4081/aiua.2023.11311*

LETTER TO EDITOR

Role of spinal anesthesia in robot-assisted radical prostatectomy: Gamble or opportunity?

Lorenzo Spirito [1], Annachiara Marra [2], Vincenzo Mirone [3], Celeste Manfredi [1], Ferdinando Fusco [1], Luigi Napolitano [3], Giuseppe Servillo [2], Nicola Logrieco [2], Pasquale Buonanno [2]

[1] Urology Unit, Department of Woman, Child and General and Specialized Surgery, University of Campania "Luigi Vanvitelli", Naples, Italy;
[2] Department of Neurosciences, Reproductive and Odontostomatological Sciences, University of Naples "Federico II", Naples, Italy;
[3] Urology Unit, Department of Neurosciences, Reproductive Sciences and Odontostomatology, Urology Unit, University of Naples "Federico II", Naples.

Submitted 14 March 2023; Accepted 23 March 2023

To the Editor,

Although postoperative pain associated with *robot-assisted radical prostatectomy* (RARP) is less than pain following the open technique, it remains a fundamental issue as it can be a significant source of discomfort for the patient and lengthen recovery times after surgery. The optimal management of pain after RARP is far from being fully elucidated and many factors have to be evaluated to choose the best analgesic approach (1). Pain management in the postoperative period is classically achieved through the administration of intermittent or continuous intravenous drugs; opioids and *non-steroidal anti-inflammatory drugs* (NSAIDs) represent the cornerstones of this approach. These drugs have many potential *adverse effects* (AEs). NSAIDs can affect renal and platelet function leading to kidney injury and significant bleeding, while opioids can be associated with delayed recovery of gut motility, urinary retention, dizziness, nausea, vomiting, and immunosuppression (2). Spinal anesthesia is emerging as an alternative technique to control the postoperative pain or even to avoid general anesthesia not only in urological but also in cardiac, gynecological, and spine laparoscopic and robotic surgery (Table 1) (3-6). It allows to reduce the drugs dosage and, consequently, their AEs. However, several additional advantages can be identified. Spinal anesthesia is performed before the induction of general anesthesia and its analgesic effect covers also the intraoperative period, so lower dosage of intraoperative opioids can be used along with lower minimum alveolar concentration of inhalational anesthetics, thus leading to an important reduction of postoperative nausea and vomiting along with a faster recovery of consciousness after general anesthesia; furthermore, the reduction of analgesic drugs during anesthesia can contribute to the hemodynamic stability. Recently, some concerns have been raised about the immunosuppressive effect of opioids and, consequently, the potential risk of promoting metastatic spread of cancer cells; therefore, reducing opioid administration in the perioperative period is even more important (7). *Pikramenos et al.* reported their experience in 60 men, underwent combined spinal/epidural anaesthesia during radical retropubic prostatectomy: They showed that combined spinal/epidural anaesthesia is a safe procedure to perform and is associated with less intraoperative blood loss and potentially reduced risks of postoperative complications (8).

The role of spinal anesthesia should also be considered in the management of the bladder spasm and the discomfort due to urethral catheter which can impact on the patient satisfaction and on the ability to early recover autonomous walking, with possible dramatic consequences on the risk of thromboembolism and on the length of hospital stay (9).

Interestingly, several adjuvants can be added to the solution injected in the subarachnoid space thus increasing the ability to achieve the desired effects with very small amounts of drugs. Ketamine, dexmedetomidine, midazolam, and clonidine are some examples of drugs which are commonly used with or without opioids to prolong and/or potentiate the effect of the local anesthetic. Many combinations of these drugs for spinal anesthesia have so far been reported in literature and appropriate use of their different pharmacological properties can be employed to manage not only postoperative pain but also intraoperative analgesia, allowing RARP to be performed only with spinal anesthesia and light sedation. No study is currently available on the topic, however, as part of a clinical trial, we have begun performing the first cases of RARP under spinal anesthesia in our center, with encouraging preliminary results demonstrating the feasibility and potential of this novel technique.

Some authors have expressed concerns regarding the risk-benefit ratio of spinal anesthesia, as this technique can cause severe AEs. An accidental puncture of an epidural blood or a spinal nerve can lead to permanent injuries such as motor and sensory loss of the lower limbs, loss of sphincters continence, and typical neuropathic symptoms. These complications are actually very rare; for example, the reported incidence of spinal hematoma is about 1:220,000 cases and a careful medical history along with appropriate management of anti-platelet and anticoagulant drugs can significantly reduce the risk (10).

Absolute contraindications to spinal anesthesia are patient refusal, injection site infection, increased intracranial pressure (except for pseudotumor cerebri), allergy to the drugs to be injected, and uncorrected hypovolemia (as spinal anesthesia

Table 1.
*Use of spinal anesthesia and analgesia in robotic and laparoscopic surgery (**see Supplementary material for references**).*

Article	Study design	Surgery	Groups	Duration of intervention	Outcomes
Beilstein CM et al, 2022	RCT	Urological/RARP or open radical prostatectomy	General anesthesia associated with: Subarachnoid analgesia (SSS) Transversus abdomnis plane block (TAP) Systemic lidocaine (SA)	Group SSS: 282 min [240; 322] Group TAS: 270 min [240; 300] Group SA: 274 min [240; 312]	No differences in QoR; no differences in postoperative pain
Gontero P. et al, 2022	Case report	Urologicalc/robotic partial nephrectomy	Continuous subarachnoid anesthesia	2h 45 min	Patient hemodinamically stable; no intraoperative desaturation; optimal postoperative analgesia
Dhawan R et al, 2021	RCT	Cardiac/robotic totally endoscopic coronary artery bypassor	General anesthesia without (groups GA) with subarachnoid analgesia (group SA)	Group GA: 290 (238-346) min Group SA: 315 (235-366) min	Group SA showed less postoperative pain, less need for postoperative morphine, and less cough
Shim JW et al, 2021	RCT	Urological/RARP	General anesthesia with (group non-ITMB) or without (group ITMB) intrathecal morphine and bupivacaine	group non-ITMB: 120 (108-143)) min group ITMB: 120 (115-130 min	Group ITMB less postoperative pain and opioids consumption
Shim JW et al, 2020	Prospective observational	Urological /RALP	General anesthesia with: Group IV-PCA: intravenous patient-controlled analgesia Group RSB: rectus sheath bupivacaine block Group ITMB: intrathecal morphine and bupivacaine	Group IV-PCA: 123 (109-145) min Group RSB: 123 (100-141) min Group ITMB: 123 (114-138) min	Group ITMB required less intraoperative opioids and showed less postoperative pain with a lower postoperative consumption of opioids, better QoR.
Bae J et al, 2017	RCT	Urological/RALP	General anesthesia with Group ITM: intrathecal morphine+ intravenous atient-controlled analgesia Group IV-PCA: only intravenous patient-controlled analgesia	Group ITM: 171 ± 42 min Group IV-PCA: 164 ± 41 min	Group ITM showed less postoperative pain and morphine consumption
Segal D et al, 2014	RCT	Urogynecological/robotic sacrocervicopexy	General anesthesia without (group GA) or with subarachnoid anesthesia (SA)		Group SA showed less postoperative pain, lower postoperative consumption of opioids, and a higher satisfaction of patients and nurses
Ross SB et al, 2013	RCT	General surgery/Laparo-endoscopic single-site (LESS) cholecystectomy	General anesthesia (group GA) vs Epidural anesthesia (group EA)	Group GA: 65.2 ± 25.1 min Group EA: 64.5 ± 21.5 min	Group EA showed less postoperative pain

QoR: quality of recovery; RALP: robot-assisted laparoscopic prostatectomy; RCT: randomized control trial.

causes vasodilation due to sympathetic block). Relative contraindications are sepsis, coagulopathy, fixed cardiac output states, aortic stenosis (previously considered an absolute contraindication), indeterminate neurological disease, multiple sclerosis and other demyelinating diseases (as demyelinated nerves seem more susceptible to local anesthetic toxicity (11). In conclusion spinal anesthesia to perform RARP can be a gamble or an opportunity depending on the players who take part to the match: the appropriate assessment and selection of the patient, the correct management of the drugs affecting coagulation and platelet function, and the proper use of adjuvants in the solution to be injected are essential for a successful and safe spinal anesthesia. However, the role of spinal anesthesia in the context of RARP needs to be evaluated in randomized controlled trials with adequate sample size and follow-up. Not only the impact on the postoperative pain but also on other sources of possible discomfort for the patient should be investigated. The feasibility and relative advantages and disadvantages of spinal anesthesia when used as a replacement for general anesthesia should be clarified with adequate comparative studies. Moreover, future studies should compare the spinal anesthesia with novel techniques of regional analgesia such as erector spinae plane and transversus abdominis plane blocks, which are less invasive and consequently safer than the intrathecal administration of drugs.

References

1. Joshi GP, Jaschinski T, Bonnet F, Kehlet H. PROSPECT collaboration. Optimal pain management for radical prostatectomy surgery: what is the evidence? BMC Anesthesiol. 2015; 15:159.

2. Koh JC, Lee J, Kim SY, et al. Postoperative Pain and Intravenous Patient-Controlled Analgesia-Related Adverse Effects in Young and Elderly Patients: A Retrospective Analysis of 10,575 Patients. Medicine (Baltimore). 2015; 94:e2008.

3. Gontero P, Oderda M, Calleris G, et al. Awake Da Vinci robotic partial nephrectomy: First case report ever in a situation of need. Urol Case Rep. 2022; 42:102008.

4. Giampaolino P, Della Corte L, Mercorio A, et al. Laparoscopic gynecological surgery under minimally invasive anesthesia: a prospective cohort study. Updates Surg. 2022; 74:1755-1762.

5. Dhawan R, Daubenspeck D, Wroblewski KE, et al. Intrathecal Morphine for Analgesia in Minimally Invasive Cardiac Surgery: A Randomized, Placebo-controlled, Double-blinded Clinical Trial. Anesthesiology. 2021; 135:864-876.

6. Gao S, Wei J, Li W, et al. Accuracy of Robot-Assisted Percutaneous Pedicle Screw Placement under Regional Anesthesia: A Retrospective Cohort Study. Pain Res Manag. 2021; 2021:6894001.

7. Lee BM, Singh Ghotra V, Karam JA, et al. Regional anesthesia/analgesia and the risk of cancer recurrence and mortality after prostatectomy: a meta-analysis. Pain Manag. 2015; 5:387-95.

8. Pikramenos K, Zachou M, Apostolatou E, et al. The effects of method of anaesthesia on the safety and effectiveness of Radical Retropubic Prostatectomy. Arch Ital Urol Androl 2022; 94:396-400.

9. Morgan MS, Ozayar A, Friedlander JI, et al. An Assessment of Patient Comfort and Morbidity After Robot-Assisted Radical Prostatectomy with Suprapubic Tube Versus Urethral Catheter Drainage. J Endourol. 2016; 30:300-5.

10. Moen V, Dahlgren N, Irestedt L. Severe neurological complications after central neuraxial blockades in Sweden 1990-1999. Anesthesiology 2004; 101:950-9.

11. Carpenter RL, Caplan RA, Brown DL, et al. Incidence and risk factors for side effects of spinal anesthesia. Anesthesiology 1992; 76:906-16.

Correspondence

Lorenzo Spirito, MD
lorenzospirito@msn.com

Celeste Manfredi, MD
manfredi.celeste@gmail.com

Ferdinando Fusco, MD
ferdinando-fusco@libero.it
Urology Unit, Department of Woman, Child and General and Specialized Surgery, University of Campania "Luigi Vanvitelli", Naples

Annachiara Marra, MD
dottmarraannachiara@gmail.com

Giuseppe Servillo, MD
giuseppe.servillo@unina.it

Nicola Logrieco, MD
nicola.logrieco@unina.it

Pasquale Buonanno, MD
pasquale.buonanno@unina.it
Department of Neurosciences, Reproductive and Odontostomatological Sciences, University of Naples "Federico II", Naples, Italy

Vincenzo Mirone, MD
mirone@unina.it
Luigi Napolitano, MD (Corresponding Author)
dr.luiginapolitano@gmail.com
Department of Neurosciences, Reproductive Sciences and Odontostomatology
University of Naples "Federico II"
Via Pansini 5, 80131 Naples, Italy

Conflict of interest: The authors declare no potential conflict of interest.