

# Anesthesia for robotic thyroidectomy without infusion of neuromuscular block- case report

## Abstract

**Background:** New technologies in medicine have allowed robotic thyroidectomy (RT) to be performed and has shown superior cosmetic results when compared to the conventional open procedures. This case report of RT was scheduled to maintain anesthesia without neuromuscular blockade, due to the need to monitor the recurrent laryngeal nerve by the surgical team.

**Case report:** Woman, 58 years old, 69 kg, 161 cm, ASA II physical status, with history of right breast cancer, and thyroid nodule. Proposed surgical treatment with a robot. Multimodal anesthesia was carried out and after two 2 through TOF there was no neuromuscular blockade. The resection was performed without problems. The patient was discharged the day after surgery.

**Conclusion:** Despite numerous articles suggesting the use of deep neuromuscular blockade, this case due to the need to stimulate and preserve the recurrent laryngeal nerve, after induction this technique was not used, without any difficulty in performing RT, where total anesthesia lasted 6 hours.

**Keywords:** anesthesia, thyroidectomy, robotic, facelift approach, da Vinci robot

Volume 15 Issue 3 - 2024

Grace Haber,<sup>1</sup> Luiz Eduardo Imbelloni,<sup>2</sup> Anna Lúcia Calaça Rivoli,<sup>3</sup> Rodrigo Jaeger Bellinaso,<sup>4</sup> Luiz Eduardo Silva Borges,<sup>4</sup> Sylvio Valença de Lemos Neto,<sup>5</sup> Ana Cristina Pinho<sup>6</sup>

<sup>1</sup>Anesthesiologist at the National Cancer Institute (INCA), Responsible for the INCA Pain Clinic, Brazil

<sup>2</sup>Senior Researcher at the National Cancer Institute (INCA), Brazil

<sup>3</sup>Anesthesiologist at the National Cancer Institute (INCA), Brazil

<sup>4</sup>Resident of the CET-SBA of the National Cancer Institute (INCA) Anesthesiology Service, Brazil

<sup>5</sup>INCA Anesthesiologist, Responsible for the CET-SBA of the National Cancer Institute, Brazil

<sup>6</sup>INCA Anesthesiologist, Co-Responsible for the CET-SBA of the National Cancer Institute, Brazil

**Correspondence:** Dr. Luiz Eduardo Imbelloni, Av. Epitácio Pessoa, 2356/203, Lagoa, 22411-072- Rio de Janeiro, RJ, Brazil, Tel + 55. 11.99429-3637, Email dr.luiz.imbelloni@gmail.com

**Received:** June 01, 2024 | **Published:** June 17, 2024

## Introduction

In a recent review, three approaches for robotic thyroidectomy (RT) were described: Trans axillary, retro auricular (facelift) and transoral.<sup>1</sup> Later there were new descriptions and modifications of these three approaches, and both gasless unilateral axillary and postauricular facelift approaches are feasible, with no significant adverse events in patients, and result in excellent cosmesis.<sup>2</sup> After the start of robotic surgery, a study with 84 patients comparing outcomes, postoperative distress, and patient satisfaction, for patients undergoing open thyroidectomy with RT showed that although postoperative pain levels and complications were comparable in the two groups, open thyroidectomy requires a shorter operative time.<sup>3</sup> RT offered several distinct advantages, including very good to excellent cosmetic results, reduced postoperative neck discomfort, and less adverse swallowing symptoms. This case report of RT was scheduled to maintain anesthesia without neuromuscular blockade, due to the need to monitor the recurrent laryngeal nerve by the surgical team.

## Case report

A fast-track protocol was registered on the Brazil platform (CAAE: 09091312.1.0000.5179), to study perioperative procedures in patients of National Cancer Institute (INCA). The Ethics Research Committee approved the study protocol (Number: 171.924), and the patient signed the Informed Consent Form.

Woman, 58 years old, 69 kg, 161 cm, ASA II physical status. Diabetic patient regularly using metformin (850 mg) and gliclazide (60 mg), both orally. History of right breast cancer, having had surgical treatment associated with chemotherapy and radiotherapy. Patient diagnosed with a thyroid nodule (1cm), with surgical indication of robotic right partial thyroidectomy (da Vinci Surgical

System™, Intuitive Surgical, Inc., Sunnyvale, CA, USA), requiring intraoperative assessment of the integrity of the recurrent laryngeal nerve. Preoperative laboratory tests were within normal limits, and airway assessment showed no predictors of difficult airway.

The surgical proposal was to perform a robotic right partial thyroidectomy due to a 1 cm nodule in the right lobe using intraoperative monitoring of the integrity of the recurrent laryngeal nerve. After signing the informed consent form and a detailed explanation of the anesthetic technique for the patient and her family, resection of the thyroid tumor through facelift incision under general anesthesia (Figure 1). Premedication was not given preoperatively. After the patient arrived in the operating room, monitoring was performed with electrocardiogram, non-invasive blood pressure, pulse oximeter, electroencephalographic analysis (bispectral index-Covidien), electromyography (TOF-TwitView), and venoclysis in the left upper limb with 18G and 20G extracath. Before anesthetic induction, cefazolin 2g, dipyrone 2g, dexamethasone 10mg and ketorolac 30mg were administered.

After evaluating all vital signs, anesthetic induction was performed with fentanyl 200µg, lidocaine 200mg, target-controlled propofol TCI (target 1.8), rocuronium 60mg, and orotracheal intubation with wired TOT 7.5. The patient was maintained under total intravenous general anesthesia with an infusion of propofol (total dose 2,150mg), remifentanyl (total dose 4,000µg), dexmedetomidine (total dose 160µg), magnesium sulfate 2g, ketamine 20mg, and lidocaine 100mg. After induction and intubation, the patient was placed in position to fix the robot (Figure 2). No problematic events occurred during induction or intubation. For maintenance of anesthesia, the target effect concentrations of propofol and remifentanyl were 4µg/ml and 3 ng/ml respectively, and were adjusted by units of 0.5, if needed. Mechanical ventilation was supported by oxygen 2 l/min.

During the postauricular access the thyroid gland, lasting 2 hours, there were responses to TOF. Subsequently, the patient did not present neuromuscular blockade, with TOF>0.9 (mean TOF = 98%), the integrity of the recurrent laryngeal nerve was assessed using the motor evoked potential. The surgery was uneventful, and the patient remained immobile during robotic dissection, the tumor was resected without any difficulty Figure 3.

The surgery lasted 4 hours and 30 minutes, and the anesthesia lasted 6 hours Figure 4. At the end of anesthesia, dipyrone 2g and ondansetron 8mg were administered; At the time of extubation the patient had TOF = 99%. The total infused volume of saline solution (250 ml), lactated ringer (1,600 ml) was 1,850 ml and the total diuresis was 1,600 ml. After aspiration of the upper airways and return of spontaneous ventilation, she was extubated and subsequently taken to the post-anesthesia care unit (PACU), where she remained stable and had no complaints. She was discharged from the PACU 2 hours after the end of the surgery and discharged from the hospital the morning of the following day, with normal speech and breathing and no complaints of pain at the site of the surgical incision.



Figure 3 Tumor before resection.



Figure 1 Photography of the surgery appointment.



Figure 2 Position of the robot during surgery.

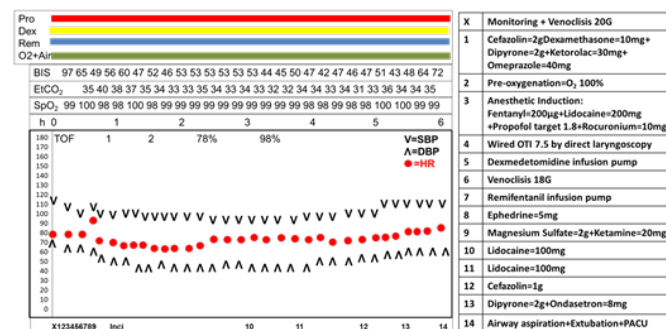


Figure 4 Anesthesia and medication record during the procedure.

## Discussion

This case report, without the use of neuromuscular blockade after anesthetic induction, showed that after 2h there was no residual blockade by TOF, thus the need to stimulate the recurrent laryngeal nerve was obtained and preserved during RT, anesthesia lasting 6 hours. In a single-blinded prospective, randomized study, 88 patients underwent transaxillary RT to receive either the moderate or deep neuromuscular block; with the aim of evaluating postoperative pain, paresthesia, and sensory changes after surgery.<sup>4</sup> This study demonstrated that deep neuromuscular block could reduce postoperative pain but was unable to demonstrate that deep neuromuscular block reduces paresthesia or hypoesthesia after the surgery. In another article, the authors stated that the anesthetic technique uses oxygen, air mixture with inhalational (sevoflurane) agent and opioids (fentanyl/remifentanyl infusion for maintenance of anaesthesia, and continuous uniform depth of muscle relaxation, to avoid movements of the surgical instrument.<sup>5</sup> In the present case, the anesthetic technique was multimodal without the continuous use of neuromuscular blockade.

In a study with 160 patients with thyroid nodules divided into four groups of 40 patients undergoing RT via three approaches (transoral, transaxillary, post-auricular) or conventional trans cervical thyroidectomy, evaluating postoperative cosmetic outcomes, showed that the three robotic techniques are superior to that of conventional thyroidectomy.<sup>6</sup> The cosmetic outcomes of the transoral and transaxillary approaches seem to be better than those of the postauricular approach. In our first case of RT, the incision performed was a facelift and the result in both the immediate and late postoperative period was extremely satisfactory for the patient.

In a recent review of the surgical treatment of in well-differentiated thyroid carcinoma, it was concluded that in terms of oncological efficacy, morbidity, and quality of life, outcomes seem comparable

in thyroid cancer patients undergoing either open or robotic thyroidectomy.<sup>7</sup> Due to this study and the introduction of the robotic technique for various surgical procedures in oncological surgery, thyroidectomy procedures were initiated with the help of the robot, without any complications. Ninety patients who were undergoing RT were randomly assigned to the lidocaine or the control groups, that systemic lidocaine administration was associated with reductions in chronic postsurgical pain and sensory disturbances at the surgical sites were evaluated three months after surgery but did not reduce postoperative pain and quality of recovery.<sup>8</sup> In the present case, lidocaine is part of the multimodal anesthesia used in the hospital and showed an improvement in pain in the PACU and in the ward.

With the aim of evaluating the complications of 3,000 patients undergoing RT for cancer, the technique was shown to be safe with a good postoperative period outcomes with minimal morbidity.<sup>9</sup> In 2010, a case of cardiac arrest during RT due to local stimulation of the carotid sinus was described, easily reversed with the use of atropine and reversion to normal rhythm.<sup>10</sup> In the same year, a case of endotracheal tube cuff rupture during RT was reported two hours after the start of surgery.<sup>11</sup> It is known that once the robot manipulator is activated, the position of the control table cannot be changed without removing it from the patient, so reintubation was performed with direct laryngoscopy without moving the robot away of the patient.<sup>11</sup> In our first RT, no complications occurred during the procedure.

## Conclusion

Surgeries using robots allow control and precision of surgical instruments in minimally invasive microsurgery procedures, transluminal endoscopic surgery, ophthalmological operations, urological procedures, and intrauterine fetal surgery. RT has gained popularity in recent years and offering several advantages over conventional open surgery, including lower incidence of pain, better cosmetic patient satisfaction and no difference in cancer control or safety. Despite numerous articles suggesting the use of deep neuromuscular blockade, in this specific case with the option for monitor the recurrent laryngeal nerve we shows that is feasibility the maintenance the appropriate multimodal general anesthesia without neuromuscular block for robotic surgery, where total anesthesia lasted 6 hours.

## Acknowledgments

None.

## Conflicts of interest

The authors declare that there are no conflicts of interest.

## References

1. Chang EHE, Kim HY, Koh YW, et al. Overview of robotic thyroidectomy. *Gland Surg.* 2017;6(3):218–228.
2. Sung ES, Ji YB, Song CM, et al. Robotic thyroidectomy: comparison of a post auricular facelift approach with a gasless unilateral axillary approach. *Otolaryngol Head Neck Surg.* 2016;154(6):997–1004.
3. Lee J, Nah KY, Kim RM, et al. Differences in postoperative outcomes, function, and cosmesis: open versus robotic thyroidectomy. *Surg Endosc.* 2010;24(12):3186–3194.
4. Bae MI, Kang SW, Lee JS, et al. Effects of deep neuromuscular block during robot-assisted transaxillary thyroidectomy: a randomized controlled trial. *J. Clin. Med.* 2023;12(11):3633.
5. Kakar PN, Das J, Roy PM, et al. Robotic invasion of operation theatre and associated anaesthetic issues: a review. *Indian J Anaesth.* 2011;55(1):18–25.
6. Lee DW, Bang HS, Jeong JH, et al. Cosmetic outcomes after transoral robotic thyroidectomy: Comparison with transaxillary, postauricular, and conventional approaches. *Oral Oncology.* 2021;114:105139.
7. Pavlidis ET, Psarras KK, Symeonidis NG, et al. Robot-assisted thyroidectomy versus open thyroidectomy in the treatment of well differentiated thyroid carcinoma: review article. *JSLs.* 2021;25(3):e2021.00032.
8. Choi KW, Nam KH, Lee JR, et al. The effects of intravenous lidocaine infusions on the quality of recovery and chronic pain after robotic thyroidectomy: a randomized, double-blinded, controlled study. *World Journal of Surgery.* 2017;41(5):1305–1312.
9. Ban EJ, You JY, Kim WW, et al. Surgical complications after robotic thyroidectomy for thyroid carcinoma: a single center experience with 3,000 patients. *Surg Endosc.* 2014;28(9):2555–2563.
10. Chung HS, Park CM, Kim ES, et al. Temporary cardiac arrest in patient under robotically assisted total thyroidectomy causing carotid sinus hypersensitivity: a case report. *Korean J Anesthesiol.* 2010;59(Suppl):S137–S140.
11. Lee HC, Yun MJ, Goo EK, et al. Rupture of endotracheal tube cuff during robot-assisted endoscopic thyroidectomy: a case report. *Korean J Anesthesiol.* 2010;59(6):416–419.