

## Study of Analgesic Efficacy of Bilateral Superficial Cervical Plexus Block Administered Before Thyroid Surgery under General Anesthesia in Coastal Karnataka Population

Sambram Shenoy<sup>1</sup>, Jyothsna Gopinathan N. K<sup>2</sup>, Dr Sudham Shetty<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Anesthesiology, Kanachur Institute of Medical Sciences Natekal-575018, Karnataka

<sup>2</sup>Assistant Professor, Dept of Anesthesiology, Kanachur Institute of Medical Sciences, Derlakatte, Post Natekal-575018

<sup>3</sup>Assistant Professor, Dept of Anesthesiology, Kanachur Institute of Medical Sciences, Derlakatte, Post Natekal-575018

Received: 25-12-2023 / Revised: 23-01-2024 / Accepted: 26-02-2024

Corresponding Author: Dr. Sambram Shenoy

Conflict of interest: Nil

### Abstract:

**Background:** Bilateral superficial cervical plexus block (BSC PB) is widely used for managing pain after surgery, but the ideal dosage of anesthetic agents has to be determined to manage the severity of post-thyroid surgical pain.

**Method:** 60 (sixty) patients were selected for BSCPB with a saline group P (n= 20 patients), Ropivacaine 0.487% Group R (n= 20 patients). Ropivacaine 0.487% plus Clonidine 50µg group RC (n= 20 patients). Sufentanil was given during the intraoperative period for a 20% increase in arterial mean pressure or heart rate in patients with a bispectral index between 40 and 60. All patients received 4 gm of acetaminophen during the first 24 hours after surgery. The pain score was checked every 4th hourly, and Nefopam was given to reduce pain with scores >4 on a numeric pain scale.

**Results:** The comparison of the mean values of demographic characteristics, age, height, and duration of surgery (minutes) remains insignificant (p>0.001) thus indicating all groups have similar parameters. The SBP at the end of resection, extubation was statistically significant in group RC (p<0.001). The operative requirement of sufentanil and pain score in PACU were statistically significant in Group RC compared to other groups (p<0.001).

**Conclusion:** In the comparative analysis, it is concluded that group RC (Ropivacaine +Clonidine) was effective in the management of pain reduction and safer to maintain hemodynamic status.

**Keywords:** Thyroidectomy, Visual Analgesic Scale, Post-Anesthesia Care Unit (PACU), Ropivacaine, Clonidine.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

### Introduction

Thyroid disease is one of the major diseases in the Indian population. Hence, thyroid surgery is one of the most frequently performed surgical procedures. It is commonly performed endocrine surgery globally [1].

Despite this huge implication and frequency of thyroid surgery, the analgesic efficacy of bilateral superficial plexus block for thyroid surgery was not determined for pain, which is one of the commonest complaints in the postoperative period and has serious adverse cardiovascular, pulmonary, metabolic, and psychological outcomes [2].

Hence, bilateral superficial cervical plexus block (BSCPB) is widely used for managing pain after thyroid surgery. It is reported that block reduces the

anesthetic requirements and provides prolonged postoperative analgesia. It also decreases the pain score, rescue analgesic requirement, and overall opioid requirement in the first 24 hours postoperatively [3].

Hence, to minimize the opioid-related adverse outcomes and costs BSC PB was found to be simple, safer, cheaper, and effective for post-thyroidectomy pain management [4]. Hence, an attempt was made to evaluate and compare different dosages of anaesthetic agents to find out the ideal dose of BSC PB.

**Material and Methods:** 60 (sixty) adult patients admitted to the Kanachur Institute of Medical Sciences in Natekal (575018), Mangalore Karnataka, were studied.

**Inclusive Criteria:** ASA physical status I–II patients undergoing elective thyroid surgery under general anesthesia who gave their consent in writing were selected for study.

**Exclusion Criteria:** Patients with allergies to opioid or non-opioid analgesics, corticosteroids or non-steroidal anti-inflammatory drugs, coagulation disorders, pregnancy, age below 18 years, and refusal for general anesthesia were excluded from the study.

#### Method:

Out of 60 (sixty) patients, they were classified into three groups by the lottery system: group P received isotonic sodium chloride, and group R received 0.487% ropivacaine. In group RC, ropivacaine 0.487% plus clonidine 50ug. Sufentanil was given during the intra-operative period for a 20% increase in arterial mean pressure or heart rate in patients with a bispectral index between 40 and 60. All patients received 4 gm of acetaminophen during the first 24 hours after the operation. The pain score was checked every 4th hourly, and nefopam was given for a pain score >4 on the numeric pain scale. Anesthesia was standardized. Patients were pre-medicated with hydroxyzine (1.5 mg/kg orally) 2 hours before the surgery. General anesthesia was induced using propofol (2–3 mg/kg) and sufentanil (0.3 µg kg<sup>-1</sup>) Tracheal intubation was facilitated by the administration of atracurium 0.5 mg kg<sup>-1</sup> General anesthesia was maintained with sevoflurane (0.5-1.8%) in an oxygen nitrous oxide mixture (60/40 %).

The sevoflurane was adjusted to maintain a bispectral index (BIS: Aspect Medical Systems, Newton, MA, USA) between 40 and 60. Additional doses of sufentanil (0.15 µg/kg) were administered for variations of systolic blood pressure (SBP) and heart rate (HR) of more than 20% when compared with the values measured before operation. All the patients were admitted to PACU (post-anesthetic care unit). BSC PB (bilateral superficial cervical plexus block) was performed under general anesthesia before incision using a three-point injection technique. 10 ml of the prepared mixture were injected into each side using the same puncture orifice. A 23-gauge SC short beveled needle was inserted 2cm above the clavicle along the posterior border of the clavicular head of the sternocleido-mastoid muscle.

After an aspiration test, an S.C. injection of 6 ml of the prepared mixture was performed in the cephalic direction. Then the needle was re-oriented in the medial direction above the sterno-cleido-mastoid muscle, and 3 ml of the prepared mixture was injected. These two first injections allow anesthesia of the greater auricular and transverse cervical nerves. Finally, 1 ml of the mixture was injected S.C. at the point of puncture to block supraclavicular

nerves. The depth of the mixture injection was not > 5 mm. In order to prevent blockage of the phrenic nerve or recurrent laryngeal nerve, a post-operative laryngoscopy was performed to evaluate laryngeal palsy before the transfer of patient to PACU.

Intra-operatively SBP and HR were recorded by monitor at induction, incision, the end of resection, and extubation. The duration of surgery and sufentanil requirements were also recorded. The post-operative pain score in PACU and the number of patients who had a pain score >6 were also recorded.

The duration of the study was January 2023–January 2024.

**Statistical analysis:** Mean value of demographic characteristics of patients from different groups and comparison of SBP in different groups, Intra-operative and post-operative pain scores were compared with an ANOVA test, and significant values were noted. The statistical analysis was carried out in SPSS software. The ratio of males and females was 1:2.

#### Observation and Results

**Table 1:** Comparison of mean value of demographic characteristics

- Age (years): 46 (± 23.6) in group P, 48 (± 28.6) in group R, 48 (± 24) in group RC, F value 0.41 and p>0.96
- Height (cms): 164.6 (± 8.0) in group P, 165.2 (± 8.6) in group R, 167.2 (± 8.3) in group RC, G value 0.51 and p>0.58
- Duration of Surgery: 182.4 (±44.5) in group P, 183.6 (± 50.2) in group R, 209 (±60.2) in group RC, F=1.66 and p>0.19
- All the comparative values remain insignificant (p>0.1)

**Table 2:** Comparative study of systolic blood pressure (SBP) mm/Hg (median range)

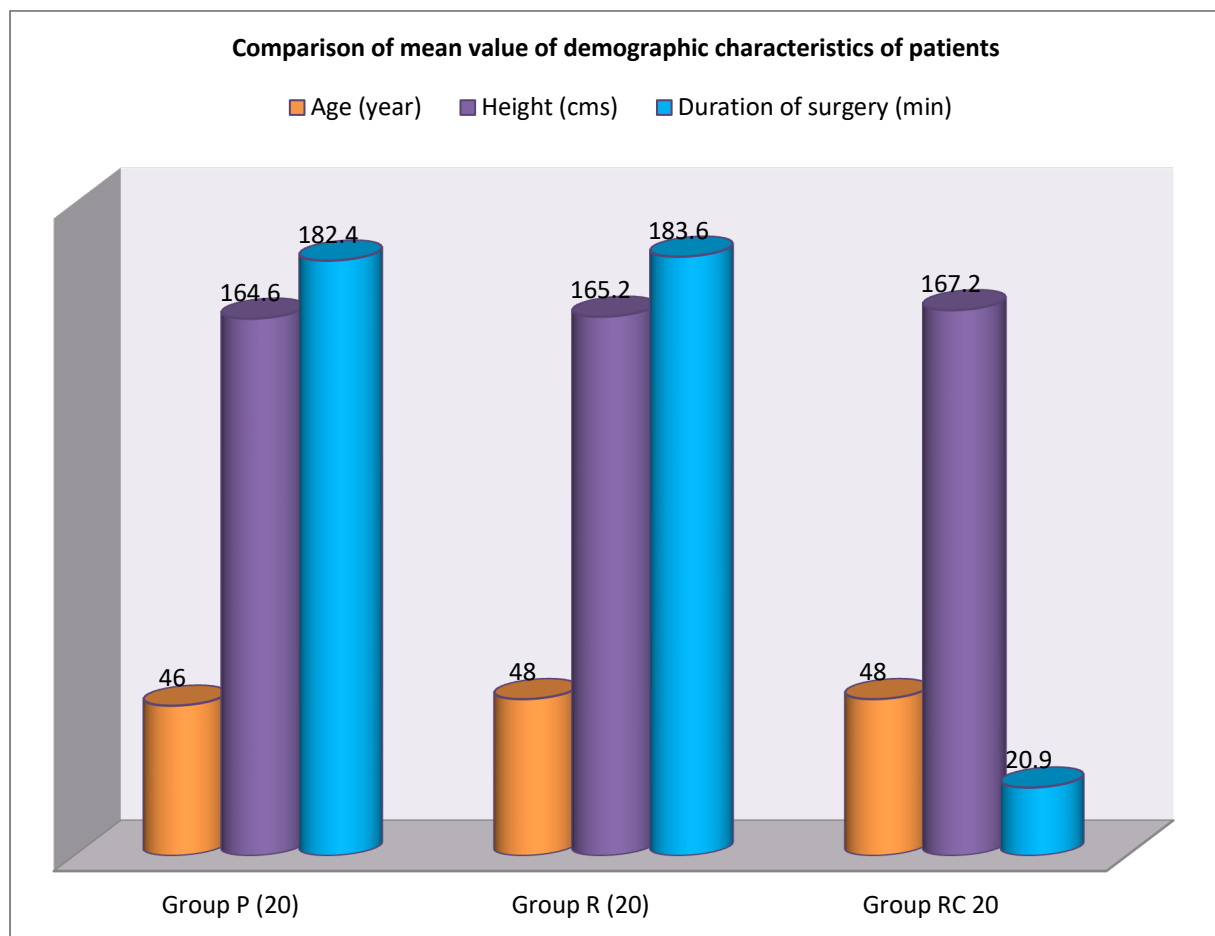
- Induction: 158 (± 22) in group P, 150 (± 19) in group R, 158 (± 24) in group RC, F value 0.90 and p>0.41
- Incision: 118 (± 21) in group P, 118 (± 14) in group R, 114 (± 18) in group RC, F value 0.33 and p>0.71
- End of resection: 143 (± 17) in group P, 136 (± 18) in group R, 122 (± 18) in group RC, F value 7.32 and p<0.001 (p value highly significant)
- Extubation: 164 (± 22) in group P, 152 (± 20) in group R, 114 (± 19) in group RC, F value 6.94 and p<0.001

**Table 3:** Comparative study of Intra-operative and operative requirements

- Intra-operative supplementary sufentanil ( $\mu\text{g}/\text{kg}^{-1}$ ): 0.618 ( $\pm 0.23$ ) in group P, 0.475 ( $\pm 0.21$ ) in group R, 0.324 ( $\pm 0.20$ ) in group RC, F value 9.46 and  $p < 0.001$  (p value was highly significant)
- Pain score in PACU was 5 in group P, 3 in group R and 3 in also
- Number patients who had pain score  $> 6 - 9$  (45%) in group P, 5 (25%) in group R, 3 (15%) in group RC

**Table 1: Comparison of mean value of demographic characteristics of patients**

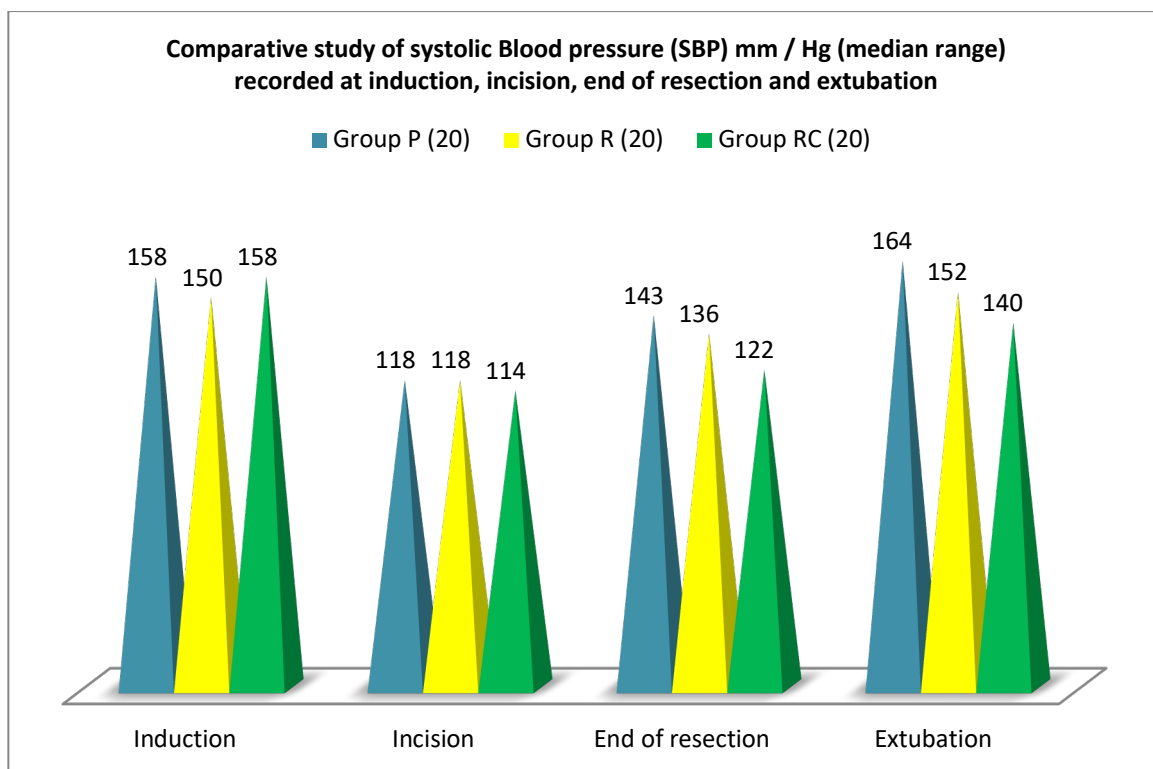
Characteristics	Group P (20)	Group R (20)	Group RC 20	P value
Age (year)	46 ( $\pm 23.6$ )	48 ( $\pm 28.6$ )	48 ( $\pm 24.0$ )	F=.41 $p > 0.96$
Height (cms)	164.6 ( $\pm 8.0$ )	165.2 ( $\pm 8.6$ )	167.2 ( $\pm 8.3$ )	F=0.58 $p > 0.58$
Duration of surgery (min)	182.4 ( $\pm 44.5$ )	183.6 ( $\pm 50.2$ )	20.9 ( $\pm 60.2$ )	F=1.66 $p > 0.19$



**Figure 1: Comparison of mean value of demographic characteristics of patients**

**Table 2: Comparative study of systolic Blood pressure (SBP) mm / Hg (median range) recorded at induction, incision, end of resection and extubation**

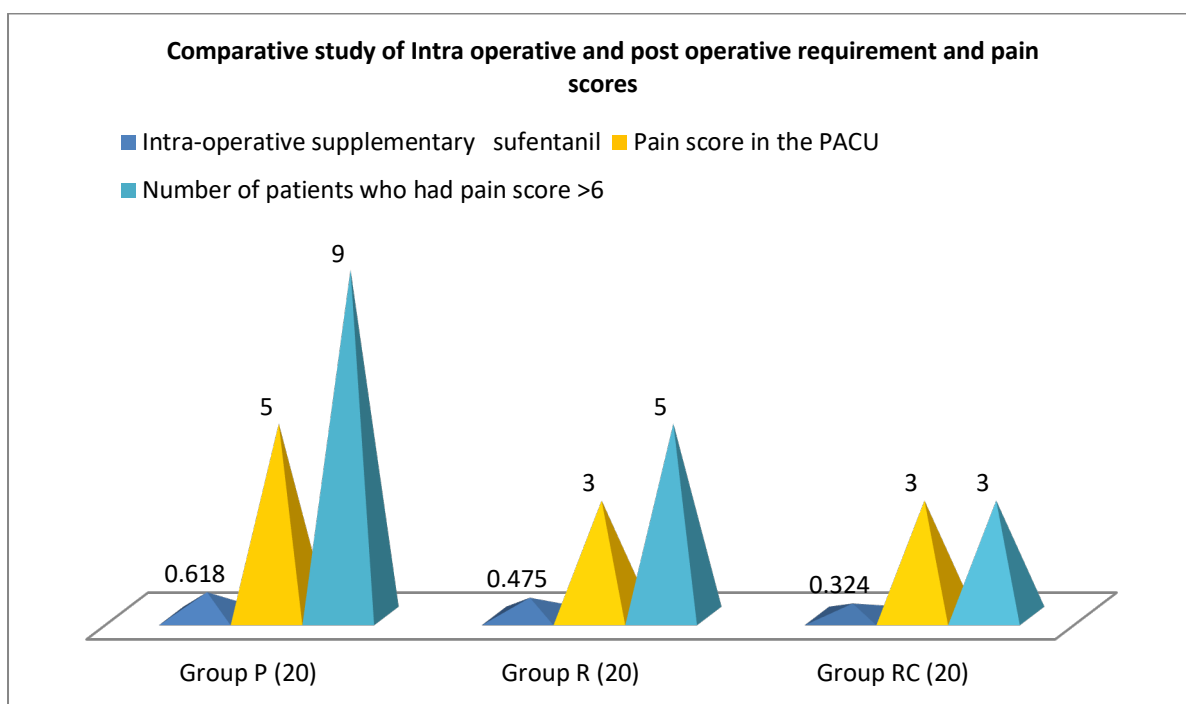
Details	Group P (20)	Group R (20)	Group RC (20)	f value	p value
Induction	158 ( $\pm 22$ )	150 ( $\pm 19$ )	158 ( $\pm 24$ )	0.90	$p > 0.41$
Incision	118 ( $\pm 14$ )	118 ( $\pm 14$ )	114 ( $\pm 18$ )	0.33	$p > 0.71$
End of resection	143 ( $\pm 17$ )	136 ( $\pm 18$ )	122 ( $\pm 18$ )	7.32	$P < 0.001$
Extubation	164 ( $\pm 22$ )	152 ( $\pm 20$ )	140 ( $\pm 19$ )	6.94	$P < 0.001$



**Figure 2: Comparative study of systolic Blood pressure (SBP) mm / Hg (median range) recorded at induction, incision, end of resection and extubation**

**Table 3: Comparative study of Intra operative and post-operative requirement and pain scores**

Details	Group P (20)	Group R (20)	Group RC (20)	f value	p value
Intra-operative supplementary sufentanil ( $\mu\text{kg}^{-1}$ )	0.618( $\pm 0.23$ )	0.475 ( $\pm 0.21$ )	0.324 ( $\pm 0.20$ )	9.46	P<0.001
Pain score in the PACU	5 (0.8)	3 (0-10)	3 (0-8)	--	--
Number of patients who had pain score >6	9 (45%)	5 (25%)	3 (15%)		



**Figure 3: Comparative study of Intra operative and post operative requirement and pain scores**

## Discussion

Study of the analgesic efficacy of a bilateral superficial cervical plexus block administered before thyroid surgery under general anesthesia in the coastal Karnataka population.

In the mean value comparison of a demographic profile like age (years), Height and duration of surgery had an insignificant p value ( $p < 0.001$ ). It confirms the characters are similar in all three groups (Table 1). In the comparative study, SBP (systolic blood pressure) at the end of resection was 143 ( $\pm 17$ ) in group P, 136 ( $\pm 18$ ) in group R, and 122 ( $\pm 18$ ) in group RC, and the F value was 7.32 and  $p < 0.001$  (the p value was highly significant).

Moreover, at the time of extubation 164 ( $\pm 22$ ) in group P, 152 ( $\pm 20$ ) in group R, and 140 ( $\pm 19$ ) in group RC, the F value was 6.94 and  $p < 0.001$  (the p value was highly significant) (Table 2). In the comparative study of intra-operative and operative requirements and pain scores - sufentanil (mg/kg) supplementation—0.618 ( $\pm 0.23$ ) in group P, 0.475 ( $\pm 0.21$ ) in group R, and 0.324 ( $\pm 0.20$ ) in group RC, the F value was 9.46 and  $p < 0.001$  (the p value was highly significant). The pain in PACU was 5, and the highest pain score was 9 (45%) observed in group P (Table 3). These findings are more or less in agreement with previous studies [5,6,7].

This study confirmed that BSCPB with general anesthesia reduced postoperative pain and analgesic consumption in patients who underwent thyroid surgery compared to those who received only general anesthesia [8]. VAS was considerably reduced in BSC PB patients during intra-operation and post-surgery. The efficacy of post-thyroidectomy BSC PB in opioid consumption is a matter of debate. This study also found the block group required less sufentanil than the general anesthetic group [9].

Severe post-operative pain control increases the level of stress hormones and the rate of peri-operative complications; hence, general anesthesia alone is often insufficient as post-operative analgesia and additional doses can manage the post-operative pain.

It is also reported that PSCPB significantly reduces nausea and vomiting in the postoperative period [10]. Hence, in the present study not a single case of nausea and vomiting is reported. Two-point bilateral BSCPB has a major analgesic effect on patients after total thyroidectomy, with a statistically significant reduction in postoperative pain scores. [11].

For the successful blockage, injecting superficially on the superior brachial plexus is recommended in previous studies [12] as in the present, a three-point blockade was performed to get satisfactory results during intraoperatively and postoperatively to manage the pain score.

## Summary and Conclusion

Present study of the analgesic efficacy of BSC PB under general anesthesia. The patients were administered ropivacaine and clonidine had improved intra-operative analgesia. These combinations were quite efficient in managing the VAS score by reducing the analgesic requirement after thyroid surgery. The present study demands that such clinical trials be conducted on a larger number of patients in high-tech hospitals to combat the adverse effects and confirm the significant findings of the present study.

**Limitation of study:** Owing to the tertiary location of the research center, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

This research paper was approved by the Ethical Committee of the Kanachur Institute of Medical Sciences, Natekal-575018, Karnataka.

## References

1. Ballantyne J, Cousins M: Managing acute pain in the developing world, *Int. Assoc. Study Pain* 2011, 19 (3); 1-6.
2. Canker E: Effect of bilateral superficial cervical block in postoperative analgesia in thyroid gland surgery performed under general anesthesia *Ege. J. Med.* 2015, 54 (4); 182–6.
3. Mayhow D, Sahgal N: Analgesic efficacy of bilateral superficial cervical plexus block for thyroid surgery *Br. J. Anesthesia* 2018, 120 (2); 241–5.
4. Sardar K, Rahman S: The analgesic requirement after thyroid surgery under general anesthesia with bilateral superficial cervical block *mymensingh Med. J.* 2013, 22 (1); 49–52.
5. Karthikeyan VS, Sistla SC: Randomized controlled trial on efficacy of bilateral superficial cervical plexus block in thyroidectomy *path pract* 2013, 13 (7); 539–46.
6. Shih ML, Duh QY: Bilateral superficial cervical plexus block combined with general anesthesia administered in the thyroid surgery *world J. Surg.* 2010, 34 (10); 2338–43.
7. Stefen T, Warsch Kow R: Randomized controlled trial of bilateral superficial block versus placebo in thyroid surgery *Br. J. Surg.* 2010, 97 (7); 1000–6.
8. Cal HD, Lin CZ: Bilateral superficial cervical block reduces postoperative nausea and vomiting and early postoperative pain in thyroidectomy. *Turkey klinikleri J. Med. Res.* 2012, 40; 1390–8.
9. Suren M, Okan I: Factors associated with the pain catastrophizing scale and validation in a sample of the Turkish population.
10. Alkan Karkish, Hakan Tapor: Peri-operative analgesic efficacy of bilateral superficial cervical plexus block in patients undergoing thy-

- roidectomy Rev. Bros. Anesthesiol 2019, 69 (5); 455-40
11. Kesisoglou T, Papavramids TS: Superficial selective cervical plexus block following total thyroidectomy Head and Neck 2010, 32; 984-8
  12. Kang KH, Kim BS: The benefits of permissive ropivacaine infiltration for redesign postoperative pain after robotic bilateral axillo-breast approach thyroidectomy Ann. Surg. 2005, 89; 325-9.