

## PENELITIAN

# Cost Effectiveness General Anesthesia Combined With Scalp Block Compared To General Anesthesia In Patients Undergoing Removal Tumor Craniotomy In Dr. Sardjito Hospital

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### ABSTRAK

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**Latar Belakang:** Pelayanan anestesi harus familiar dengan prinsip dasar ekonomi medis dan ikut berperan serta secara aktif dalam mengendalikan biaya dari segi obat, alat, personel untuk tindakan anestesi. Pemberi layanan anestesi memiliki banyak kesempatan untuk mengurangi biaya ini, tentu saja dengan tujuan tetap menjaga keseimbangan antara keuntungan, keamanan dan biaya. Pada operasi kraniotomi pengangkatan tumor blok skalp adalah salah satu pilihan alternatif yang dapat dikombinasikan dengan pembiusan umum. Blok skalp sendiri dapat menumpulkan stres respon pada kraniotomi dan dapat menjaga gejala hemodinamik yang tidak diinginkan. **Tujuan:** Mengetahui cost effectiveness blok skalp pada pasien kraniotomi pengangkatan tumor di RSUP Dr SARDJITO. **Metode:** Dua puluh orang pasien dengan rentang usia 18 – 65 tahun dengan tumor intrakranial yang menjalani tindakan kraniotomi pengangkatan tumor di RSUP Dr. SARDJITO dikelompokkan menjadi dua kelompok perlakuan dengan teknik pembiusan umum dan pembiusan umum kombinasi blok skalp, kedua teknik tersebut dihitung pemakaian obat masing- masing kemudian di bandingkan harga keduanya. **Hasil:** Total keseluruhan biaya pada blok skalp kombinasi general anestesi adalah Rp. 1.347.276 lebih rendah Rp. 377.833 dibandingkan general anestesi Rp. 1.725.109 dengan perbedaan yang bermakna ( $p=0,005$ ). Begitu pula pada biaya per jam pada kelompok pada blok skalp kombinasi general anestesi Rp. 286.351 lebih rendah Rp. 97.107 dibandingkan general anestesi Rp. 383.457 dengan perbedaan yang bermakna ( $p=0,038$ ). **Kesimpulan:** Kombinasi anestesi umum dan blok skalp menggunakan levobupivacaine 0,5% terbukti lebih cost effective dibandingkan anestesi umum dan skalp blok menggunakan plasebo pada pasien tumor supratentorial yang menjalani kraniotomi pengangkatan tumor.

**Kata kunci:** Cost effectiveness, Kraniotomi, Blok Skalp, Anestesi.

## ABSTRACT

**Background:** Providers of anesthesia services have many opportunities to reduce these costs, of course with the aim of maintaining balance between profit, security and costs. Craniotomy surgery removal of the scalp block tumor is an alternative option that can be combined with general anesthesia. The scalp block itself can blunt stress response in craniotomy and can maintain unwanted hemodynamic instability. **Purpose:** Find out the cost effectiveness of the scalp block in craniotomy patients removing tumors at Dr. SARDJITO Hospital. **Method:** Twenty patients ranging in age from 18 - 65 years with intracranial tumors who underwent tumor binding craniotomy at RSUP Dr. SARDJITO is grouped into two treatment groups with general anesthesia and general anesthesia with a combination of scalp blocks, both techniques are calculated using drugs and consumables during the operation. **Results:** Total cost on the general anesthesia combined scalp block was Rp. 1,347,276 lower Rp. 377,833 compared to general anesthesia Rp. 1,725,109 with a significant difference ( $p = 0.005$ ). Similarly, the hourly cost of the group in the combined general anesthesia scalp block was Rp. 286,351 Rp. 97,107 lower than general anesthesia Rp. 383,457 with a significant difference ( $p = 0.038$ ). **Conclusion:** Combination of general anesthesia and scalp block using 0.5% levobupivacaine more cost effective than general anesthesia and scalp block with placebo in supratentorial tumor patients undergoing tumor removal craniotomy.

**Keywords:** Cost effectiveness, Craniotomy, Scalp Block, Anesthesii

## Introduction

Brain tumors are about 85-90% of all tumors in the central nervous system (CNS). In the United States, the data from the Central Brain Tumor Registry of the United States 2015 shows that incidence of brain tumors is 21.42 per 100,000 population per year. The incidence rate for brain tumors around the world based on the world population standard is 3.4 per 100,000 population with mortality rate of 4.25 per 100,000 per year. Astrocytomas and glioblastomas account for about 38% of the total central nervous system, while meningioma and other mesenchymal tumors are about 27%. The remainder consists of a variety of brain tumors, including the pituitary, schwannoma, CNS lymphoma and others.<sup>1</sup> In a prospective study, about two-thirds of patients reported moderate to severe pain after craniotomy. Analgesia management

surveys show there is few consensus about good analgesia in craniotomy. For this reason, regional blocks of sensory innervation to the scalp have become a frequently used addition to systemic analgesia for craniotomy.<sup>2</sup>

Perioperative interventions that aimed at improving the quality of anesthesia and are expected to reduce costs have become increasingly popular in recent years. Anesthesiologists are often faced with choices among different treatment strategies with few data available on comparative cost effectiveness. Multidisciplinary interventions are the most cost-effective overall "dominant" interventions (better results, lower costs), including fast recovery and standardization, and a bundle of perioperative delirium prevention<sup>1</sup>.

The choice of anesthesia technique is usually associated with an increase in the quality of

intraoperative anesthesia, minimal side effects, reduced recovery time, and excellent postoperative pain control. The choice of regional anesthesia may be economically more advantageous than general anesthesia<sup>3</sup>.

The nerve block technique on the scalp (scalp block) can be used for all supratentorial intracranial procedures. Scalp blocks can minimize hemodynamic responses to surgical stimulation, can reduce the use of intraoperative anesthetic drugs, and can reduce postoperative pain and analgesic consumption<sup>4</sup>.

### Methods

The study design used in this study was a retrospective Cohort design, to determine the price comparison using general anesthesia combined with scalp blocks compared with general anesthesia alone. The study was taken from medical record data in the period of August, September and October 2019. The study was divided into two groups where each group was given parallel treatment. The target population was patients with supratentorial tumors in Dr. Sardjito General Hospital. Samples were divided into general anesthesia combined with scalp blocks using Levobupivacaine 0.5% and general anesthesia combined with scalp blocks using saline as control. This study has received ethical clearance approval.

Subjects were patients who underwent

scheduled supratentorial tumor removal craniotomy in the surgical center building (GBST) of Dr. Sardjito General Hospital in the period August, September and October 2019, aged 18 - 65 years old, underwent the first tumor removal craniotomy, and ASA II physical status. Exclusion criteria were patients with local anesthetic agents allergic and patients with surgical plans longer than 6 hours.

### Results

Research has been taken from medical record data in the period of August, September and October 2019. The sample consisted of 20 patients who were included in the inclusion criteria (Patients who underwent tumor removal craniotomy (supratentorial) with a scalp block, in the surgical center building (GBST) of Dr. Sardjito General Hospital, aged 18 - 65 years old, underwent the first tumor removal craniotomy, and ASA II physical status). The total patients for 3 months were 39 patients, who were divided into 2 groups, namely general anesthesia combined with scalp blocks (treatment), and general anesthesia alone (control). The study was taken from a medical record that was obtained in the medical records room of Dr. Sardjito General Hospital Yogyakarta after getting ethical clearance from the Ethic Committee of Research of Gadjah Mada University and Dr. Sardjito General Hospital.

	Treatment (n=10)		Control (n=10)		p	
	General Anesthesia + Scalp Block		General Anesthesia + Placebo			
	n	%	n	%		
Age (years old)	46,5 ± 10,3		45,7 ± 13,1		0,881 <sup>#</sup>	
Sex	Men	5	50.0%	2	20.0%	0,160 <sup>s</sup>
	Women	5	50.0%	8	80.0%	
Weight	61,4 ± 9,22		62,6 ± 11,5		0,800 <sup>#</sup>	

ASA	II	10	100.0%	10	100.0%	-
Duration (hours)		4,85 ± 0,94		4,80 ± 0,92		0,906 <sup>#</sup>

The mean age of the treatment group was 46.5 years and the control group was 45.7 years. The proportion of men and women in the treatment group was equal, while in the control group the majority were women (80.0%). All patients were

in ASA II. The average duration of the two groups was 4.8 hours. There were no significant differences in age, sex, ASA and duration between the treatment and control groups ( $p > 0.05$ ).

	Treatment (n=10)		Control (n=10)		Difference	p
	General Anesthesia + Scalp Block		General Anesthesia + Placebo			
	Mean	SD	Mean	SD		
Fentanyl (amp)	5.60	1.71	13.20	3.05	7,6	0,000*
Propofol (amp)	8.60	3.75	7.70	4.16	0,9	0,618
Rocuronium (amp)	3.50	1.43	3.10	1.10	0,4	0,493
Levobupivacaine 0,5% (amp)	1.00	.00	.	.	1	-
Sevoflurane (ml)	113.00	33.68	123.00	51.22	10	0,612

The mean of fentanyl in the treatment group was 5.6 ampoules, 7.6 times lower than the control group which averaged 13.20 ampoules, showing a significant difference ( $p = 0.000$ ). If we convert into Rupiah the difference between the two

groups was Rp. 421,990. The treatment group had 0.9 ampoule of propofol, 0.4 ampoule of rocuronium and 10 ml of sevoflurane lower than the control group, but statistically did not show a significant difference ( $p > 0.05$ ).

	Treatment (n=10)		Control (n=10)		Difference	p
	General Anesthesia + Scalp Block		General Anesthesia + Placebo			
	Mean	SD	Mean	SD		
Additional cost (Rupiah)	17.173,00	14.461,24	12.596,33	9901,36	4.576,7	0,494
Total cost (Rupiah)	1.347.276,00	196.230,16	1.725.109,20	318802,55	377.833,2	0,005*
Cost per hour (Rupiah)	286.350,71	62.815,83	383.457,98	121945,68	97.107,26	0,038*

The average additional cost in the treatment group was Rp 4,576 more than the control group but did not show a significant difference ( $p > 0.05$ ). The total cost in the treatment group was Rp 1,347,276, it was Rp 377,833 lower than the control group which was Rp. 1,725,109 with a significant difference ( $p = 0.005$ ). Likewise, the cost per hour in the treatment group was Rp. 286,351, it was Rp. 97,107 lower than the

control group which was Rp. 383,457 with a significant difference ( $p = 0.038$ ).

### Discussion

The sample of this study were 20 patients with inclusion criteria were aged 18 - 65 years old, underwent the first tumor removal craniotomy, and ASA II physical status. The mean age of the treatment group was 46.5 years and the control

group was 45.7 years. The proportion of men and women in the treatment group was equal, while in the majority of control group was women (80.0%). All patients were in ASA II. The mean body weight of patients was 61.4 kg in the treatment group and 62.6 kg in the control group. The average of surgery duration of the two groups was 4.8 hours. There were no significant differences in age, sex, body weight, ASA and duration between the treatment and control groups ( $p > 0.05$ ).

The average usage of Fentanyl in the treatment of 5.6 ampoules, 7.6 ampoules lower than the control group which was 13.20 ampoules, showed a significant difference ( $p = 0,000$ ). The treatment group had 0.9 ampoule of Propofol, 0.4 ampoule of Rocuronium and 10 ml of Sevoflurane lower than the control group, but statistically did not show a significant difference ( $p > 0.05$ ). Thus it was found that general anesthesia combined with scalp blocks using Levobupivacaine was able to reduce the consumption of Fentanyl. In line with previous studies conducted in Thailand, the use of scalp blocks can reduce Fentanyl by 20%<sup>5</sup>. However, other anesthetics showed lower use in the scalp block group compared to the control group, but statistically showed insignificant results. Anesthesia balances are the main target in the anesthesia process. In neuroanesthesia, intravenous drugs that can be used are Propofol and Fentanyl, with maintenance of Fentanyl  $2 \mu\text{g} / \text{kg} / \text{hour}$  and Propofol  $200 \mu\text{g} / \text{kg} / \text{minute}$  will provide relatively stable anesthesia. Opioids play an important role in achieving anesthetic balance. Opioids can reduce preoperative pain, blunt the autonomic responses during airway manipulation, able to maintain hemodynamic stability during surgical stimulation, do not depress cardiovascular and as postoperative analgesia with minimal side effects. It can reduce the use of inhalation agents too. The ideal opioids used

are those that can be used according to the titration dose, can blunt the hemodynamic response during intubation, prevent the pain response during surgery, do not depress cardiovascular and as postoperative analgesia with minimal side effects.<sup>6</sup> Pain control has an important role, by avoiding hyperventilation, tachycardia and increased intracranial pressure due to pain as well as maintaining hemodynamics and reducing cerebral oxygen metabolic rate. Fentanyl is often used in anesthesia, because it has fast onset of action and relatively short duration. This is consistent with studies conducted in India with 60 sample patients with craniotomy tumor removal of supratentorial tumors performed with scalp blocks using 0.5% Bupivacaine that showed a significant decrease in intraoperative Fentanyl use compared with scalp blocks using saline.<sup>7</sup>

### Conclusion

The combination of general anesthesia and scalp block using 0.5% levobupivacaine proved to be more cost effective than general anesthesia and scalp block using placebo in supratentorial tumor patients who underwent tumor removal craniotomy.

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